STIC Search Report
EIC 1700

STIC Database Tracking Number: 209243

TO:	From:
Shamim Ahmed **Location: REM 9C73** **Art Unit : 1765** **December 4, 2006** **Case Serial Number: 10/520272**	**Mei Huang** **Location: EIC 1700** **REMSEN 4B28** **Phone: 571/272-3952** **Mei.huang@uspto.gov**

Search Notes

Examiner Ahmed,

Please feel free to contact me if you have any questions or if you would like to refine the search query,

Thank you for using STIC services!

Mei Huang

Anekwe, Imelda (ASRC)

209243

From: SHAMIM AHMED [shamim.ahmed@uspto.gov]
Sent: Sunday, December 03, 2006 9:34 AM
To: STIC-EIC1700
Subject: Database Search Request, Serial Number: 10/520,272

Requester:
SHAMIM AHMED (P/1765)
Art Unit:
GROUP ART UNIT 1765
Employee Number:
75030
Office Location:
REM 09C73
Phone Number:
(571)272-1457
Mailbox Number:

Case serial number:
10/520,272
Class / Subclass(es):
252/79.1 and 216/67
Earliest Priority Filing Date:
07/17/2002
Format preferred for results:
Paper
Search Topic Information:
Please, search for dry-etching gas of claim 7, specially fro perfluoro-2-butyne.
Special Instructions and Other Comments:

UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

Bib Data Sheet

CONFIRMATION NO. 4526

SERIAL NUMBER	FILING OR 371(c) DATE	CLASS	GROUP ART UNIT	ATTORNEY DOCKET NO.
10/520,272	01/14/2005 RULE	216	1763	050011

APPLICANTS

Toshiro Yamada, Tokyo, JAPAN;
Tatsuya Sugimoto, Tokyo, JAPAN;

**** CONTINUING DATA ***************************

This application is a 371 of PCT/JP03/09023 07/16/2003

**** FOREIGN APPLICATIONS *********************

JAPAN 2002-208604 07/17/2002

Foreign Priority claimed	STATE OR COUNTRY	SHEETS DRAWING	TOTAL CLAIMS	INDEPENDENT CLAIMS
☐ yes ☐ no 35 USC 119 (a-d) conditions met ☐ yes ☐ no ☐ Met after Allowance Verified and Acknowledged _____ Examiner's Signature Initials	JAPAN		12	3

ADDRESS

23850

TITLE

Method of dry etching, dry etching gas and process for producing perfluoro-2-pentyne

FILING FEE RECEIVED	FEES: Authority has been given in Paper	
900	No. _____ to charge/credit DEPOSIT ACCOUNT No. _____ for following:	☐ All Fees ☐ 1.16 Fees (Filing) ☐ 1.17 Fees (Processing Ext. of time) ☐ 1.18 Fees (Issue) ☐ Other _____ ☐ Credit

STIC Search Results Feedback Form

USPTO

EIC17000

Questions about the scope or the results of the search? Contact *the EIC searcher or contact*:

Kathleen Fuller, EIC 1700 Team Leader
571/272-2505 REMSEN 4B28

Voluntary Results Feedback Form

- *I am an examiner in Workgroup:* ☐ *Example: 1713*
- *Relevant prior art* ***found****, search results used as follows:*
  - ☐ 102 rejection
  - ☐ 103 rejection
  - ☐ Cited as being of interest.
  - ☐ Helped examiner better understand the invention.
  - ☐ Helped examiner better understand the state of the art in their technology.

Types of relevant prior art found:

- ☐ Foreign Patent(s)
- ☐ Non-Patent Literature
  (journal articles, conference proceedings, new product announcements etc.)

- *Relevant prior art* ***not found:***
  - ☐ Results verified the lack of relevant prior art (helped determine patentability).
  - ☐ Results were not useful in determining patentability or understanding the invention.

Comments:

Drop off or send completed forms to EIC1700 REMSEN 4B28

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=> fil reg
FILE 'REGISTRY' ENTERED AT 11:09:38 ON 04 DEC 2006
USE IS SUBJECT TO THE TERMS OF YOUR STN CUSTOMER AGREEMENT.
PLEASE SEE "HELP USAGETERMS" FOR DETAILS.
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=> d his nofile

     (FILE 'HOME' ENTERED AT 10:01:14 ON 04 DEC 2006)

     FILE 'HCAPLUS' ENTERED AT 10:01:24 ON 04 DEC 2006
L1             1 SEA US2005247670/PN

     FILE 'REGISTRY' ENTERED AT 10:03:42 ON 04 DEC 2006
L2             6 SEA (138495-42-8/BI OR 378-22-3/BI OR 685-63-2/BI OR
                 692-50-2/BI OR 72804-49-0/BI OR 7631-86-9/BI)

                 D SAV
                 ACT NGU913A/A
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L3   (   3457695)SEA (C(L)F)/ELS
L4   (      3598)SEA L3 AND 2/ELC.SUB
L5   (   3425093)SEA L3 (L) H/ELS
L6   (     28133)SEA L5 (L) 3/ELC.SUB
L7         31731 SEA L4 OR L6
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L8             5 SEA L2 AND L7
L9               STR
L10              SCR 2043
L11             50 SEA SUB=L7 SSS SAM (L9 NOT L10)
L12           2734 SEA SUB=L7 SSS FUL (L9 NOT L10)
                 SAV L12 AHM272S1/A
L13            4 SEA L2 AND L12
L14            1 SEA L8 NOT L13
L15              STR
L16           11 SEA SUB=L7 SSS SAM (L9 NOT L15 NOT L10)
L17              STR
L18            7 SEA SUB=L7 SSS SAM (L9 NOT L15 NOT L17 NOT L10)
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                 SAV L19 AHM272S2/A
L20            2 SEA L2 AND L19

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L22          909 SEA L19
L23          752 SEA L20
L24       237301 SEA ETCH? OR PHOTOETCH? OR PLASMAETCH? OR PLASMA(W)ETCH?
                 OR ENGRAV? OR PHOTOENGRAV?
L25           90 SEA L12 (L) L24
L26           15 SEA L19 (L) L24
L27           15 SEA L20 (L) L24
L28           15 SEA L26 OR L27
L29        10807 SEA L24(3A) (GAS## OR GASEOUS? OR GASIF? OR VAPOR? OR
                 VAPOUR?)
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L31           13 SEA L28 AND L29
L32           15 SEA L28 OR L31
L33           11 SEA L32 AND (1907-2002)/PY,PRY,AY
L34           31 SEA L30 NOT L28
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priority yr

L35 23 SEA L34 AND (1907-2002)/PY,PRY,AY

priority yr.

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L4 (3598)SEA FILE=REGISTRY L3 AND 2/ELC.SUB
L5 (3425093)SEA FILE=REGISTRY L3 (L) H/ELS
L6 (28133)SEA FILE=REGISTRY L5 (L) 3/ELC.SUB
L7 31731 SEA FILE=REGISTRY L4 OR L6
L9 STR

Ak~^F
1 2

NODE ATTRIBUTES:
DEFAULT MLEVEL IS ATOM
GGCAT IS UNS AT 1
DEFAULT ECLEVEL IS LIMITED
ECOUNT IS M4-X8 C AT 1

GRAPH ATTRIBUTES:
RING(S) ARE ISOLATED OR EMBEDDED
NUMBER OF NODES IS 2

STEREO ATTRIBUTES: NONE
L10 SCR 2043
L12 2734 SEA FILE=REGISTRY SUB=L7 SSS FUL (L9 NOT L10)

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SEARCH TIME: 00.00.01

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DEFAULT ECLEVEL IS LIMITED

GRAPH ATTRIBUTES:
RING(S) ARE ISOLATED OR EMBEDDED
NUMBER OF NODES IS 4

STEREO ATTRIBUTES: NONE

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NODE ATTRIBUTES:
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GRAPH ATTRIBUTES:
RING(S) ARE ISOLATED OR EMBEDDED
NUMBER OF NODES IS 4

STEREO ATTRIBUTES: NONE

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FILE 'HCAPLUS' ENTERED AT 11:10:11 ON 04 DEC 2006
USE IS SUBJECT TO THE TERMS OF YOUR STN CUSTOMER AGREEMENT.
PLEASE SEE "HELP USAGETERMS" FOR DETAILS.

=> d l33 ibib abs hitstr hitind 1-11

L33 ANSWER 1 OF 11 HCAPLUS COPYRIGHT 2006 ACS on STN
ACCESSION NUMBER: 2004:60850 HCAPLUS
DOCUMENT NUMBER: 140:102052
TITLE: Method of dry **etching**, dry **etching gas**, and process for producing perfluoro-2-pentyne
INVENTOR(S): Yamada, Toshiro; Sugimoto, Tatsuya
PATENT ASSIGNEE(S): Zeon Corporation, Japan
SOURCE: PCT Int. Appl., 25 pp.
CODEN: PIXXD2
DOCUMENT TYPE: Patent
LANGUAGE: Japanese
FAMILY ACC. NUM. COUNT: 1
PATENT INFORMATION:

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
WO 2004008515	A1	20040122	WO 2003-JP9023	200307 16
			<--	
W: CN, KR, US				
RW: AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IT, LU, MC, NL, PT, RO, SE, SI, SK, TR				
JP 2004055680	A2	20040219	JP 2002-208604	200207 17
			<--	
EP 1542268	A1	20050615	EP 2003-764209	200307 16
			<--	
R: AT, BE, CH, DE, DK, ES, FR, GB, GR, IT, LI, LU, NL, SE, MC, PT, IE, SI, FI, RO, CY, TR, BG, CZ, EE, HU, SK				
CN 1669129	A	20050914	CN 2003-816972	200307 16
			<--	
US 2005247670	A1	20051110	US 2005-520272	200501 14

& Current Application

PRIORITY APPLN. INFO.: JP 2002-208604 A <-- 200207 17
WO 2003-JP9023 W <-- 200307 16

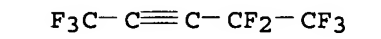
AB A method of dry etching, comprising exposing a resist film to radiation of 195 nm or less wavelength so as to form a resist pattern of 200 nm or less min. line width and subjecting the resist pattern to dry etching using a fluorinated compound of C4-C6 having at least one unsatd. bond as an **etching gas.** Perfluoro-2-pentyne, perfluoro-2-butyne, nonafluoro-2-pentene and perfluoro-2-pentene are preferably used as the fluorinated compound Perfluoro-2-pentyne can be synthesized by reacting a 1,1,1-trihalo-2,2,2-trifluoroethane with pentafluoropropylene aldehyde into a 2-halo-1,1,1,4,4,5,5,5-octafluoro-2-pentene and eliminating a hydrogen halide from this 2-pentene.

IT **692-50-2**, Perfluoro-2-butyne
RL: CPS (Chemical process); PEP (Physical, engineering or chemical process); TEM (Technical or engineered material use); PROC (Process); USES (Uses)
(**etching gas**; dry **etching** of silicon oxide and resist films by)

RN 692-50-2 HCAPLUS
CN 2-Butyne, 1,1,1,4,4,4-hexafluoro- (8CI, 9CI) (CA INDEX NAME)

IT **378-22-3P**
RL: SPN (Synthetic preparation); TEM (Technical or engineered material use); PREP (Preparation); USES (Uses)
(**etching gas**; dry **etching** of silicon oxide and resist films by)

RN 378-22-3 HCAPLUS
CN 2-Pentyne, 1,1,1,4,4,5,5,5-octafluoro- (9CI) (CA INDEX NAME)



IC ICM H01L021-3065
CC 74-5 (Radiation Chemistry, Photochemistry, and Photographic and Other Reprographic Processes)
ST dry **plasma etching etchant gas** perfluoro pentyne; silicon oxide resist film etching
IT 685-63-2, Perfluoro-1,3-butadiene **692-50-2**, Perfluoro-2-butyne 72804-49-0, Perfluoro-2-pentene
RL: CPS (Chemical process); PEP (Physical, engineering or chemical process); TEM (Technical or engineered material use); PROC (Process); USES (Uses)
(**etching gas**; dry **etching** of silicon oxide and resist films by)
IT **378-22-3P**
RL: SPN (Synthetic preparation); TEM (Technical or engineered material use); PREP (Preparation); USES (Uses)

(**etching gas**; dry **etching** of silicon oxide and resist films by)
REFERENCE COUNT: 8 THERE ARE 8 CITED REFERENCES AVAILABLE FOR THIS RECORD. ALL CITATIONS AVAILABLE IN THE RE FORMAT

L33 ANSWER 2 OF 11 HCAPLUS COPYRIGHT 2006 ACS on STN
ACCESSION NUMBER: 2004:18200 HCAPLUS
DOCUMENT NUMBER: 140:86072
TITLE: Plasma etching process showing high etch rate and selectivity to masks in semiconductor device fabrication
INVENTOR(S): Fujimoto, Motomu
PATENT ASSIGNEE(S): Tokyo Electron, Ltd., Japan
SOURCE: Jpn. Kokai Tokkyo Koho, 7 pp.
CODEN: JKXXAF
DOCUMENT TYPE: Patent
LANGUAGE: Japanese
FAMILY ACC. NUM. COUNT: 1
PATENT INFORMATION:

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
JP 2004006575	A2	20040108	JP 2002-228418	20020806

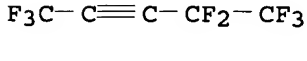
<--

PRIORITY APPLN. INFO.: JP 2002-228418 20020806

<--

AB In the process, ethant gases containing linear C5F8, preferably 1,1,1,4,4,5,5,5-Octafluoro-2-pentyne, are used. The process prevents etch stop.

IT **378-22-3**
RL: PEP (Physical, engineering or chemical process); PYP (Physical process); PROC (Process)
(**plasma etching** process showing high **etch** rate and selectivity to masks by using ethant gases containing linear C5F8 in semiconductor device fabrication)
RN 378-22-3 HCAPLUS
CN 2-Pentyne, 1,1,1,4,4,5,5,5-octafluoro- (9CI) (CA INDEX NAME)



IC ICM H01L021-3065
CC 76-11 (Electric Phenomena)
IT Noble **gases**, processes
RL: PEP (Physical, engineering or chemical process); PYP (Physical process); PROC (Process)
(ethant **gases**; **plasma etching** process showing high etch rate and selectivity to masks by using ethant gases containing linear C5F8 in semiconductor device fabrication)
IT 74-82-8, Methane, processes 75-10-5, Difluoromethane 75-46-7, Trifluoromethane 75-73-0, Tetrafluoromethane 76-16-4, Hexafluoroethane 76-19-7, Octafluoropropane 124-38-9, Carbon

dioxide, processes 353-50-4, Carbonyl fluoride 593-53-3, Fluoromethane 630-08-0, Carbon monoxide, processes 2551-62-4, Sulfur hexafluoride 7664-41-7, Ammonia, processes 7727-37-9, Nitrogen, processes 7782-41-4, Fluorine, processes 7782-44-7, Oxygen, processes 7783-54-2, Nitrogen trifluoride 7783-61-1, Silicon tetrafluoride 10024-97-2, Nitrogen oxide (N2O), processes 10028-15-6, Ozone, processes 10102-03-1, Nitrogen oxide (N2O5) 10102-43-9, Nitrogen oxide (NO), processes 10102-44-0, Nitrogen oxide (NO2), processes 10544-73-7, Nitrogen oxide (N2O3)
RL: PEP (Physical, engineering or chemical process); PYP (Physical process); PROC (Process)
(ethant **gases; plasma etching**
process showing high etch rate and selectivity to masks by using ethant gases containing linear C5F8 in semiconductor device fabrication)

IT **378-22-3**
RL: PEP (Physical, engineering or chemical process); PYP (Physical process); PROC (Process)
(**plasma etching** process showing high **etch** rate and selectivity to masks by using ethant gases containing linear C5F8 in semiconductor device fabrication)

L33 ANSWER 3 OF 11 HCAPLUS COPYRIGHT 2006 ACS on STN
ACCESSION NUMBER: 2003:778120 HCAPLUS
DOCUMENT NUMBER: 139:269359
TITLE: Method of plasma etching
INVENTOR(S): Yamaguchi, Tomoyo; Fujimoto, Kiwamu; Kitamura, Akinori; Jy, Jeong; Fuse, Takashi; Obi, Machiko; Wada, Nobuhiro
PATENT ASSIGNEE(S): Tokyo Electron Limited, Japan
SOURCE: PCT Int. Appl., 19 pp.
CODEN: PIXXD2
DOCUMENT TYPE: Patent
LANGUAGE: Japanese
FAMILY ACC. NUM. COUNT: 1
PATENT INFORMATION:

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
WO 2003081656	A1	20031002	WO 2003-JP2750	20030307
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W: AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NI, NO, NZ, OM, PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, YU, ZA, ZM, ZW				
RW: GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZM, ZW, AM, AZ, BY, KG, KZ, MD, RU, TJ, TM, AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IT, LU, MC, NL, PT, RO, SE, SI, SK, TR, BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG				
JP 2003282540	A2	20031003	JP 2002-82717	20020325
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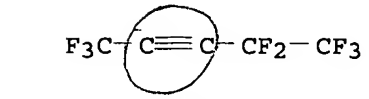
AU 2003211846	A1	20031008	AU 2003-211846	

					200303 07
US 2005101140	A1	20050512	US 2004-949366 <--		200409 27
PRIORITY APPLN. INFO.:			JP 2002-82717 <--	A	200203 25
			WO 2003-JP2750 <--	W	200303 07

AB A method of plasma etching is described, which comprises introducing a gas containing 1,1,1,4,4,5,5,5-octafluoro-2-pentyne into a treatment chamber, and forming a plasma of the gas to thereby subject a SiO2 coating film in an article to be treated being present in the treatment chamber to plasma etching through a pattern having openings of a photoresist mask placed on the coating film. The method can be used for carrying out plasma etching with high selection ratio of the coating film to the photoresist and/or with the suppression of etching-stop phenomenon.

IT **378-22-3**
RL: NUU (Other use, unclassified); USES (Uses)
(C5F8, **plasma etching gas**; method of **plasma etching** of silica using 1,1,1,4,4,5,5,5-octafluoro-2-pentyne)

RN 378-22-3 HCAPLUS
CN 2-Pentyne, 1,1,1,4,4,5,5,5-octafluoro- (9CI) (CA INDEX NAME)



IC ICM H01L021-3065
CC 76-11 (Electric Phenomena)
IT **378-22-3**
RL: NUU (Other use, unclassified); USES (Uses)
(C5F8, **plasma etching gas**; method of **plasma etching** of silica using 1,1,1,4,4,5,5,5-octafluoro-2-pentyne)

REFERENCE COUNT: 6 THERE ARE 6 CITED REFERENCES AVAILABLE FOR THIS RECORD. ALL CITATIONS AVAILABLE IN THE RE FORMAT

L33 ANSWER 4 OF 11 HCAPLUS COPYRIGHT 2006 ACS on STN

ACCESSION NUMBER:	2003:276654 HCAPLUS
DOCUMENT NUMBER:	138:264244
TITLE:	Enhancement of silicon oxide etch rate and substrate selectivity with xenon addition
INVENTOR(S):	Hung, Hoiman; Caulfield, Joseph P.; Shan, Hongchin; Collins, Kenneth S.; Cui, Chunshi; Rice, Michael
PATENT ASSIGNEE(S):	Applied Materials, Inc., USA
SOURCE:	U.S., 18 pp., Cont.-in-part of U.S. Ser. No. 276,376. CODEN: USXXAM
DOCUMENT TYPE:	Patent

LANGUAGE: English
FAMILY ACC. NUM. COUNT: 2
PATENT INFORMATION:

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
US 6544429	B1	20030408	US 1999-405869	199909 24
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US 2002175144	A1	20021128	US 1999-276376	199903 25
			<--	
US 6797189	B2	20040928		
WO 2000059021	A1	20001005	WO 2000-US6630	200003 13
			<--	
W: DE, JP, KR				
DE 10084398	T	20020314	DE 2000-10084398	200003 13
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JP 2002540627	T2	20021126	JP 2000-608427	200003 13
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TW 479291	B	20020311	TW 2000-89104763	200003 15
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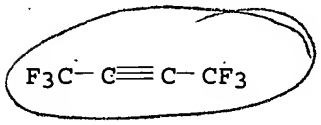
PRIORITY APPLN. INFO.:	US 1999-276376	A2	199903 25
	<--		
	US 1999-405869	A	199909 24
	<--		
	WO 2000-US6630	W	200003 13
	<--		

AB A plasma etching process, particularly useful for selectively etching oxide over a feature having a non-oxide composition, such as Si nitride and especially when that feature has a corner that is prone to faceting during the oxide etch. A primary F-containing gas, preferably hexafluorobutadiene (C_4F_6), is combined with a significantly larger amount of the diluent gas Xe (Xe) to enhance nitride selectivity without the occurrence of etch stop. The chemical is also useful for etching oxides in a time oxide etch in which holes and corners have already been formed, e.g. counterbore vias in a dual damascene structure. In this case, the relative amount of Xe need not be so high, but Xe still reduces faceting of the oxide corners. The invention may be used with related heavy fluorocarbons and other F-based **etching gases.** The plasma etching preferably includes striking the plasma with Ar, switching to Xe and the F-based gas but at reduced bias power to stabilize the plasma,

and then increasing the bias to a full etching level.

IT **692-50-2**, Hexafluoro-2-butyne
RL: NUU (Other use, unclassified); PEP (Physical, engineering or chemical process); PYP (Physical process); PROC (Process); USES (Uses)
(**etchant**; enhancement of silicon oxide **etch** rate and substrate selectivity with xenon addition)

RN 692-50-2 HCAPLUS
CN 2-Butyne, 1,1,1,4,4,4-hexafluoro- (8CI, 9CI) (CA INDEX NAME)



IC ICM H01L021-3065
INCL 216067000; 216072000; 216079000; 438723000; 438738000; 438743000
CC 76-3 (Electric Phenomena)
IT 115-25-3, Octafluorocyclobutane 392-56-3, Hexafluorobenzene 685-63-2 **692-50-2**, Hexafluoro-2-butyne 697-11-0, Hexafluorocyclobutene 3109-87-3, 1,4-Pentadiene, 1,1,2,3,3,4,5,5-Octafluoro-
RL: NUU (Other use, unclassified); PEP (Physical, engineering or chemical process); PYP (Physical process); PROC (Process); USES (Uses)
(**etchant**; enhancement of silicon oxide **etch** rate and substrate selectivity with xenon addition)

REFERENCE COUNT: 14 THERE ARE 14 CITED REFERENCES AVAILABLE FOR THIS RECORD. ALL CITATIONS AVAILABLE IN THE RE FORMAT

L33 ANSWER 5 OF 11 HCAPLUS COPYRIGHT 2006 ACS on STN
ACCESSION NUMBER: 2002:906754 HCAPLUS
DOCUMENT NUMBER: 138:10268
TITLE: A method for making a micromechanical device by removing a sacrificial layer with multiple sequential etchants
INVENTOR(S): Patel, Satyadev R.; Huibers, Andrew G.; Schaadt, Gregory P.; Heureux, Peter J.
PATENT ASSIGNEE(S): Reflectivity, Inc., USA
SOURCE: PCT Int. Appl., 41 pp.
CODEN: PIXXD2
DOCUMENT TYPE: Patent
LANGUAGE: English
FAMILY ACC. NUM. COUNT: 2
PATENT INFORMATION:

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
WO 2002095800	A2	20021128	WO 2002-US16224	200205 22
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WO 2002095800	A3	20030213		

W: AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NO, NZ, OM, PH, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VN, YU, ZA, ZM, ZW

RW: GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZM, ZW, AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE, TR, BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG

AU 2002303842 A1 20021203 AU 2002-303842 200205 22 <--

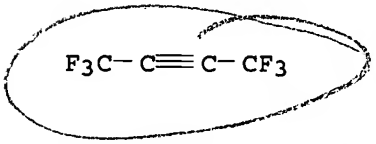
PRIORITY APPLN. INFO.: US 2001-293092P P 200105 22 <--

WO 2002-US16224 W 200205 22 <--

AB An etching method, such as for forming a micromech. device, is disclosed. In its most simple form, the invention is directed to etching a material where a first etch removes a portion of the material and fully or partially phys. removes the material, and where a subsequent etch removes addnl. material and removes the material chemical but not phys. The material can be a semiconductor material such as silicon, and the areas removed can be of any dimensions such as an elongated trench, a well or other area limited in size, or even an entire area across a substrate. The result of the first and second etches can also result in an undercut such as for micro-fluidic channels or for a thermal sensor, or for simply removing material in an IC process. One embodiment of the method is for releasing a micromech. structure, comprising, providing a sacrificial layer directly or indirectly on the substrate; providing ≥1 micromech. structural layers on the sacrificial layer; performing a 1st etch to remove a portion of the sacrificial layer, the 1st etch comprising providing an **etchant gas** and energizing the **etchant gas** so as to allow the **etchant gas** to phys., or chemical and phys., remove the portion of the sacrificial layer; performing a 2nd etch to remove addnl. sacrificial material in the sacrificial layer, the 2nd **etch** comprising providing a **gas** that chemical but not phys. etches the addnl. sacrificial material. Another embodiment of the method is for etching a Si material on or within a substrate, comprising: performing a 1st etch to remove a portion of the Si, the 1st etch comprising providing an **etchant gas** and energizing the **etchant gas** so as to allow the **etchant gas** to phys., or chemical and phys., remove the portion of Si; performing a 2nd etch to remove addnl. Si, the 2nd etch comprising providing an **etchant gas** that chemical but not phys. etches the addnl. Si.

IT **692-50-2**, Hexafluoro-2-butyne
RL: NUU (Other use, unclassified); PEP (Physical, engineering or chemical process); PYP (Physical process); PROC (Process); USES (Uses)
(**etchant**; method for making a micromech. device by removing a sacrificial layer with multiple sequential **etchants**)

RN 692-50-2 HCAPLUS
CN 2-Butyne, 1,1,1,4,4,4-hexafluoro- (8CI, 9CI) (CA INDEX NAME)



IC ICM H01L
CC 76-3 (Electric Phenomena)
IT Noble **gases**, processes
RL: NUU (Other use, unclassified); PEP (Physical, engineering or chemical process); PYP (Physical process); PROC (Prócess); USES (Uses)
(**etchant**; method for making a micromech. device by removing a sacrificial layer with multiple sequential etchants)
IT 74-82-8, Methane, processes 116-15-4, Hexafluoropropene 287-23-0, Cyclobutane 360-89-4, Octafluoro-2-butene 559-40-0, Octafluorocyclopentene 630-08-0, Carbon monoxide, processes 685-63-2, Hexafluoro-1,3-butadiene **692-50-2**, Hexafluoro-2-butyne 697-11-0, Hexafluorocyclobutene 1333-74-0, Hydrogen, processes 2551-62-4, Sulfur hexafluoride 7440-37-1, Argon, processes 7440-63-3, Xenon, processes 7727-37-9, Nitrogen, processes 7782-41-4, Fluorine, processes 7782-44-7, Oxygen, processes 7783-54-2, Nitrogen trifluoride 7783-61-1, Tetrafluorosilane 7783-66-6, Iodine pentafluoride 7787-71-5, Bromine trifluoride 7790-91-2, Chlorine trifluoride 12360-50-8, Bromine trichloride 13709-36-9, Xenon difluoride
RL: NUU (Other use, unclassified); PEP (Physical, engineering or chemical process); PYP (Physical process); PROC (Process); USES (Uses)
(**etchant**; method for making a micromech. device by removing a sacrificial layer with multiple sequential **etchants**)

L33 ANSWER 6 OF 11 HCAPLUS COPYRIGHT 2006 ACS on STN
ACCESSION NUMBER: 2002:368797 HCAPLUS
DOCUMENT NUMBER: 136:378597
TITLE: Dry **etching gas** and process for dry etching
INVENTOR(S): Nakamura, Shingo; Itano, Mitsushi
PATENT ASSIGNEE(S): Daikin Industries, Ltd., Japan
SOURCE: PCT Int. Appl., 22 pp.
CODEN: PIXXD2
DOCUMENT TYPE: Patent
LANGUAGE: Japanese
FAMILY ACC. NUM. COUNT: 1
PATENT INFORMATION:

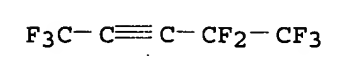
PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
WO 2002039494	A1	20020516	WO 2001-JP9769 <--	200111 08
W: JP, KR, US				
US 2004035825	A1	20040226	US 2003-415647 <--	200305 06
PRIORITY APPLN. INFO.:			JP 2000-341110 A <--	200011 08
			WO 2001-JP9769 W	200111

08

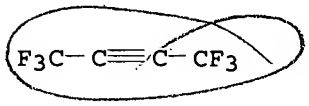
AB A dry **etching gas** for fabrication of fine circuit boards comprises a compound having a CF3C.tplbond.C- moiety. The **etchant gas** is environmentally acceptable and suitable for precision fabrication of fine circuit boards.

IT **378-22-3 692-50-2**
RL: RCT (Reactant); RACT (Reactant or reagent)
(**etchant**; dry **etching gas** and process for dry **etching**)

RN 378-22-3 HCAPLUS
CN 2-Pentyne, 1,1,1,4,4,5,5,5-octafluoro- (9CI) (CA INDEX NAME)



RN 692-50-2 HCAPLUS
CN 2-Butyne, 1,1,1,4,4,4-hexafluoro- (8CI, 9CI) (CA INDEX NAME)



IC ICM H01L021-3065
ICS H01L021-768; C23F004-00
CC 76-11 (Electric Phenomena)
IT **Etching**
(dry; dry **etching gas** and process for dry etching)
IT Printed circuit boards
(fabrication of, **etchant gas** for; dry **etching gas** and process for dry etching)
IT Ethynylation
(trifluoromethyl ethynyl group containing compds.; dry **etching gas** and process for dry etching)
IT 116-14-3, uses 116-15-4 360-89-4
RL: MOA (Modifier or additive use); RCT (Reactant); RACT (Reactant or reagent); USES (Uses)
(**etchant** additive; dry **etching gas** and process for dry etching)
IT **378-22-3 692-50-2** 20174-11-2
RL: RCT (Reactant); RACT (Reactant or reagent)
(**etchant**; dry **etching gas** and process for dry **etching**)
IT 7440-21-3, Silicon, properties
RL: DEV (Device component use); PEP (Physical, engineering or chemical process); PRP (Properties); PROC (Process); USES (Uses)
(substrate, **etching** of; dry **etching gas** and process for dry etching)
REFERENCE COUNT: 7 THERE ARE 7 CITED REFERENCES AVAILABLE FOR THIS RECORD. ALL CITATIONS AVAILABLE IN THE RE FORMAT

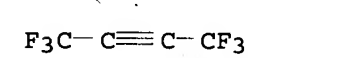
L33 ANSWER 7 OF 11 HCAPLUS COPYRIGHT 2006 ACS on STN
ACCESSION NUMBER: 2002:316842 HCAPLUS
DOCUMENT NUMBER: 137:101983
TITLE: The use of unsaturated fluorocarbons for dielectric etch applications
AUTHOR(S): Chatterjee, Ritwik; Karecki, Simon; Reif,

Rafael; Vartanian, Victor; Sparks, Terry
CORPORATE SOURCE: Microsystems Technology Laboratories, Massachusetts Institute of Technology, Cambridge, MA, 02139, USA
SOURCE: Journal of the Electrochemical Society (2002), 149(4), G276-G285
CODEN: JESOAN; ISSN: 0013-4651
PUBLISHER: Electrochemical Society
DOCUMENT TYPE: Journal
LANGUAGE: English

AB Six unsatd. fluorocarbon (UFC) gases as well as a fluorinated ether were examined for dielec. etch and global warming emissions performance and compared to three perfluorocompound (PFC) gases. All of the **gases** were capable of **etch** performance comparable to that of a typical C3F8 process, while exhibiting superior global warming emissions performance compared to the PFCs. A low-flow hexafluoro-2-butyne process was found to have a significant emissions benefit, showing a normalized emissions reduction of 88.2% compared to the C3F8 process. Two other C4F6 isomers (hexafluoro-1,3-butadiene and hexafluorocyclobutene) also exhibited redns. greater than 80%, while hexafluoropropene and octafluorocyclopentene exhibited emissions redns. greater than 70% compared to the typical C3F8 process. For the C4F6 isomers, a large portion of the emissions were a result of CHF3 formation with photoresist as the sole source of the hydrogen. An extended 4 min etch with hexafluoro-1,3-butadiene resulted in a deep via with an aspect ratio of 5:1, very high selectivity to photoresist, and no evidence of etch stopping.

IT **692-50-2**, Hexafluoro-2-butyne
RL: CPS (Chemical process); PEP (Physical, engineering or chemical process); PROC (Process)
(use of unsatd. fluorocarbons for dielec. **etch** applications)

RN 692-50-2 HCAPLUS
CN 2-Butyne, 1,1,1,4,4,4-hexafluoro- (8CI, 9CI) (CA INDEX NAME)



CC 76-3 (Electric Phenomena)
Section cross-reference(s): 59, 74

IT 115-25-3, Octafluorocyclobutane 116-15-4, Hexafluoropropene 355-25-9, Decafluorobutane 559-40-0, Octafluorocyclopentene 685-63-2, Hexafluoro-1,3-butadiene **692-50-2**, Hexafluoro-2-butyne 697-11-0, Hexafluorocyclobutene 773-14-8, Octafluorotetrahydrofuran
RL: CPS (Chemical process); PEP (Physical, engineering or chemical process); PROC (Process)
(use of unsatd. fluorocarbons for dielec. **etch** applications)

REFERENCE COUNT: 17 THERE ARE 17 CITED REFERENCES AVAILABLE FOR THIS RECORD. ALL CITATIONS AVAILABLE IN THE RE FORMAT

L33 ANSWER 8 OF 11 HCAPLUS COPYRIGHT 2006 ACS on STN
ACCESSION NUMBER: 2000:707399 HCAPLUS
DOCUMENT NUMBER: 133:275213
TITLE: Enhancement of silicon oxide etch rate and substrate selectivity with xenon addition

INVENTOR(S): Hung, Hoiman Raymond; Caulfield, Joseph; Shan, Hongqing; Rice, Michael; Collins, Kenneth S.; Cui, Chunshi
PATENT ASSIGNEE(S): Applied Materials, Inc., USA
SOURCE: PCT Int. Appl., 41 pp.
CODEN: PIXXD2
DOCUMENT TYPE: Patent
LANGUAGE: English
FAMILY ACC. NUM. COUNT: 2
PATENT INFORMATION:

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
WO 2000059021	A1	20001005	WO 2000-US6630	200003 13
			<--	
W: DE, JP, KR				
US 2002175144	A1	20021128	US 1999-276376	199903 25
			<--	
US 6797189	B2	20040928		
US 6544429	B1	20030408	US 1999-405869	199909 24
			<--	
DE 10084398	T	20020314	DE 2000-10084398	200003 13
			<--	
JP 2002540627	T2	20021126	JP 2000-608427	200003 13
			<--	

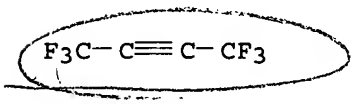
PRIORITY APPLN. INFO.:			
	US 1999-276376	A	199903 25
	<--		
	US 1999-405869	A	199909 24
	<--		
	WO 2000-US6630	W	200003 13
	<--		

AB A plasma etching process, particularly useful for selectively etching oxide over a feature having a non-oxide composition, such as silicon nitride and especially when that feature has a corner that is prone to faceting during the oxide etch. A primary fluorine-containing gas, preferably hexafluorobutadiene (C4F6), is combined with a significantly larger amount of the diluent gas xenon (Xe) to enhance nitride selectivity without the occurrence of etch stop. The chemical is also useful for etching oxides in a time oxide etch in which holes and corners have already been formed, for example counterbore vias in a dual damascene structure. In this case, the relative amount of xenon need not be so high, but xenon still reduces faceting of the oxide corners. The invention may be used with related heavy

fluorocarbons and other fluorine-based **etching gases.** The plasma etching preferably includes striking the plasma with argon, switching to xenon and the fluorine-based gas but at reduced bias power to stabilize the plasma and then increasing the bias to a full etching level.

IT **692-50-2**
RL: NUU (Other use, unclassified); PEP (Physical, engineering or chemical process); PROC (Process); USES (Uses)
(in Xe addition enhancement of selective **etching** of silicon oxide)

RN 692-50-2 HCAPLUS
CN 2-Butyne, 1,1,1,4,4,4-hexafluoro- (8CI, 9CI) (CA INDEX NAME)



IC ICM H01L021-311
CC 76-3 (Electric Phenomena)
Section cross-reference(s): 21
IT 115-25-3, Octafluorocyclobutane 392-56-3, Hexafluorobenzene 685-63-2 **692-50-2** 697-11-0, Hexafluorocyclobutene 7440-37-1, Argon, processes 72923-38-7
RL: NUU (Other use, unclassified); PEP (Physical, engineering or chemical process); PROC (Process); USES (Uses)
(in Xe addition enhancement of selective **etching** of silicon oxide)
REFERENCE COUNT: 4 THERE ARE 4 CITED REFERENCES AVAILABLE FOR THIS RECORD. ALL CITATIONS AVAILABLE IN THE RE FORMAT

L33 ANSWER 9 OF 11 HCAPLUS COPYRIGHT 2006 ACS on STN
ACCESSION NUMBER: 2000:295964 HCAPLUS
DOCUMENT NUMBER: 132:355439
TITLE: Evaluation of unsaturated fluorocarbons for dielectric etch applications
AUTHOR(S): Chatterjee, Ritwik; Karecki, Simon; Pruette, Laura; Reif, Rafael
CORPORATE SOURCE: Microsystems Technology Laboratories, MIT, Cambridge, MA, 02139, USA
SOURCE: Proceedings - Electrochemical Society (**2000**), 99-30(Plasma Etching Processes for Sub-Quarter Micron Devices), 251-262
CODEN: PESODO; ISSN: 0161-6374
PUBLISHER: Electrochemical Society
DOCUMENT TYPE: Journal
LANGUAGE: English
AB Six unsatd. fluorocarbon (UFC) gases as well as a fluorinated ether were examined for dielec. etch and global warming emissions performance and compared to three perfluoro-compound (PFC) gases. It was found that all of the **gases** were capable of **etch** performance comparable to that of a typical C3F8 process, while exhibiting superior global warming emissions performance compared to the PFCs. A low flow hexafluoro-2-butyne process was found to have a significant emissions benefit, showing a normalized emissions reduction of 88.2% compared to the C3F8 process. Two other C4F6 isomers (hexafluoro-1,3-butadiene and hexafluorocyclobutene) also exhibited redns. greater than 80%, while hexafluoropropene and octafluorocyclopentene exhibited emissions redns. greater than 70% compared to the typical C3F8 process. An

extended 4 min etch with hexafluoro-1,3-butadiene resulted in a deep via with an aspect ratio of 5:1, very high selectivity to photoresist, and no evidence of etch stopping.

IT **692-50-2**, Hexafluoro-2-butyne
RL: PEP (Physical, engineering or chemical process); PRP (Properties); PROC (Process)
(dielec. **etching** selectivity to resist; evaluation of unsatd. fluorocarbons for dielec. **etch** applications)

RN 692-50-2 HCAPLUS
CN 2-Butyne, 1,1,1,4,4,4-hexafluoro- (8CI, 9CI) (CA INDEX NAME)

CC 76-10 (Electric Phenomena)
ST unsatd fluorocarbon **gas** ether dielec **etch**
IT 76-19-7 685-63-2, Hexafluoro-1,3-butadiene **692-50-2**, Hexafluoro-2-butyne 697-11-0, Hexafluorocyclobutene
RL: PEP (Physical, engineering or chemical process); PRP (Properties); PROC (Process)
(dielec. **etching** selectivity to resist; evaluation of unsatd. fluorocarbons for dielec. **etch** applications)
REFERENCE COUNT: 16 THERE ARE 16 CITED REFERENCES AVAILABLE FOR THIS RECORD. ALL CITATIONS AVAILABLE IN THE RE FORMAT

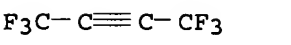
L33 ANSWER 10 OF 11 HCAPLUS COPYRIGHT 2006 ACS on STN
ACCESSION NUMBER: 1999:15451 HCAPLUS
DOCUMENT NUMBER: 130:176780
TITLE: Formation and analytics of fluorine compounds in the plasma etching in microelectronics industry
AUTHOR(S): Heinig, S.; Herzschuh, R.
CORPORATE SOURCE: Department of Analytical Chemistry, Leipzig University, Leipzig, D-04103, Germany
SOURCE: Advances in Mass Spectrometry (**1998**), 14, D035810/1-D035810/10
CODEN: AMSPAH; ISSN: 0568-000X
PUBLISHER: Elsevier Science B.V.
DOCUMENT TYPE: Journal; (computer optical disk)
LANGUAGE: English

AB The chip production in semiconductor industry is based on plasma etching technologies. For that often perfluorinated **etching gases** like CF4 and C2F6 are used. Plasma-chemical building reactions from mol. fragments are the source for a lot of ecol. [1,2] and partly critical toxicol. [3] perhalogenated substances. The aim of the anal. studies was to work out a method for registration and qual. identification of unknown compds. to estimate the risks of this technol. and to understand what is going on in the plasma. Using GC/MS a lot of perfluorocarbons with chain length of carbon up to 14 were identified. Beside electron impact ionization, chemical ionization in pos. and neg. mode were used to achieve further anal. information. NCI was the best possible sensitive ionization method for the most unsatd. perfluorocarbons.

IT **692-50-2**, Perfluoro-2-butyne
RL: ANT (Analyte); FMU (Formation, unclassified); ANST (Analytical study); FORM (Formation, nonpreparative)
(fluorocarbons formation and determination in **plasma etching** by **gas** chromatog.-mass spectrometry)

RN 692-50-2 HCAPLUS

CN 2-Butyne, 1,1,1,4,4,4-hexafluoro- (8CI, 9CI) (CA INDEX NAME)



CC 79-4 (Inorganic Analytical Chemistry)
IT Perfluorocarbons
RL: ANT (Analyte); FMU (Formation, unclassified); ANST (Analytical study); FORM (Formation, nonpreparative)
(fluorocarbons formation and determination in **plasma etching** by **gas** chromatog.-mass spectrometry)
IT Mass spectrometry
(gas chromatog. combined with; fluorocarbons formation and determination in **plasma etching** by **gas** chromatog.-mass spectrometry)
IT Gas chromatography
(mass spectrometry combined with; fluorocarbons formation and determination in **plasma etching** by **gas** chromatog.-mass spectrometry)
IT Etching
(plasma; fluorocarbons formation and determination in **plasma etching** by **gas** chromatog.-mass spectrometry)
IT 76-16-4, Perfluoroethane 116-14-3, Perfluoroethene, analysis 116-15-4, Perfluoropropene 354-92-7 355-25-9, Perfluorobutane 376-77-2, Perfluorocyclopentane 382-21-8, Perfluoroisobutene 392-56-3, Perfluorobenzene 434-64-0, Perfluorotoluene 652-23-3 **692-50-2**, Perfluoro-2-butyne 699-39-8, Perfluorocyclopenta-1,3-diene
RL: ANT (Analyte); FMU (Formation, unclassified); ANST (Analytical study); FORM (Formation, nonpreparative)
(fluorocarbons formation and determination in **plasma etching** by **gas** chromatog.-mass spectrometry)
REFERENCE COUNT: 4 THERE ARE 4 CITED REFERENCES AVAILABLE FOR THIS RECORD. ALL CITATIONS AVAILABLE IN THE RE FORMAT

L33 ANSWER 11 OF 11 HCAPLUS COPYRIGHT 2006 ACS on STN
ACCESSION NUMBER: 1997:491209 HCAPLUS
DOCUMENT NUMBER: 127:129741
TITLE: Plasma etching method using hexafluoro compound **etching gas**
INVENTOR(S): Fukuda, Seiichi
PATENT ASSIGNEE(S): Sony Corp., Japan
SOURCE: Jpn. Kokai Tokkyo Koho, 5 pp.
CODEN: JKXXAF
DOCUMENT TYPE: Patent
LANGUAGE: Japanese
FAMILY ACC. NUM. COUNT: 1
PATENT INFORMATION:

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
JP 09191002	A2	19970722	JP 1996-2397	199601 10
			<--	
PRIORITY APPLN. INFO.:			JP 1996-2397	199601

10
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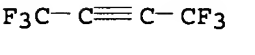
AB The method involves selectively etching a Si oxide-based material layer on an under layer using an **etching gas** containing hexafluoro-2-butyne, hexafluoro-1,3-butadiene, and/or hexafluoropropene. The method shows high etching rate and high selectivity. The method is useful for manufacturing a semiconductor device.

IT **692-50-2**, Hexafluoro-2-butyne
RL: NUU (Other use, unclassified); USES (Uses)
(**plasma etching** of SiO2 using double- or triple bond-containing hexafluoro compound)

RN 692-50-2 HCAPLUS

CN 2-Butyne, 1,1,1,4,4,4-hexafluoro- (8CI, 9CI) (CA INDEX NAME)



IC ICM H01L021-3065
ICS C23F004-00

CC 76-3 (Electric Phenomena)

ST **etching gas** hexafluorobutyne hexafluorobutadiene hexafluoropropene semiconductor; silicon oxide plasma etching semiconductor; hexafluoro alkene alkyne **etching gas** semiconductor

IT 116-15-4, Hexafluoropropene 685-63-2, Hexafluoro-1,3-butadiene **692-50-2**, Hexafluoro-2-butyne
RL: NUU (Other use, unclassified); USES (Uses)
(**plasma etching** of SiO2 using double- or triple bond-containing hexafluoro compound)

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L35 ANSWER 1 OF 23 HCAPLUS COPYRIGHT 2006 ACS on STN
ACCESSION NUMBER: 2004:969959 HCAPLUS
DOCUMENT NUMBER: 142:251425
TITLE: **Gas etching** method having a high selectivity to photoresists for providing contact holes
INVENTOR(S): Bae, Gyeong Bin; Kim, Dong Soo
PATENT ASSIGNEE(S): Ans Inc., S. Korea
SOURCE: Repub. Korean Kongkae Taeho Kongbo, No pp. given
CODEN: KRXXA7
DOCUMENT TYPE: Patent
LANGUAGE: Korean
FAMILY ACC. NUM. COUNT: 1
PATENT INFORMATION:

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
KR 2002081154	A	20021026	KR 2002-44096	200207 26

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PRIORITY APPLN. INFO.:	KR 2002-44096	200207 26

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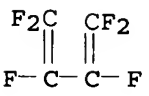
AB An **gas etching** method having a high selectivity to photoresists is provided to form stably and reliably a contact hole by performing a dual damascene process while using at least a part of **etching gas** on an organo-silica glass. An oxide and nitride layer are stacked. A substrate in which a patterned resist layer overlaps the oxide, and the nitride layer and silicon is placed in an etching chamber. The **etching gas** mixture including the organo-silica glass of low selectivity selected from a group composed of C4F6, the first fluorine, the second oxygen, the third difluoromethane and the fourth carbon monoxide is introduced into the etching chamber. The **etching gas** is excited to make the oxide and nitride layer etch selectively to the silicon and photoresist.

IT **685-63-2**
RL: CPS (Chemical process); PEP (Physical, engineering or chemical process); PROC (Process)
(in **gas etching** method having high selectivity to photoresists for providing contact holes)

RN 685-63-2 HCAPLUS
CN 1,3-Butadiene, 1,1,2,3,4,4-hexafluoro- (8CI, 9CI) (CA INDEX NAME)



IC ICM H01L021-3065
CC 76-3 (Electric Phenomena)
IT Contact holes
Etching
Photoresists
(**gas etching** method having high selectivity to photoresists for providing contact holes)

IT 75-10-5, Difluoromethane 630-08-0, Carbon monoxide, processes
685-63-2
RL: CPS (Chemical process); PEP (Physical, engineering or chemical process); PROC (Process)
(in **gas etching** method having high selectivity to photoresists for providing contact holes)

L35 ANSWER 2 OF 23 HCAPLUS COPYRIGHT 2006 ACS on STN
ACCESSION NUMBER: 2003:971681 HCAPLUS
DOCUMENT NUMBER: 140:34600
TITLE: Plasma-etching of dielectric layer with reduced striation using a fluorocarbon gas mixture
INVENTOR(S): Chae, Heeyeop; Delgadino, Gerardo; Zhao, Xiaoye; Ye, Yan
PATENT ASSIGNEE(S): Applied Materials, Inc., USA
SOURCE: U.S. Pat. Appl. Publ., 19 pp.
CODEN: USXXCO
DOCUMENT TYPE: Patent
LANGUAGE: English
FAMILY ACC. NUM. COUNT: 1
PATENT INFORMATION:

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
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US 2003228768 A1 20031211 US 2002-163607
200206
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PRIORITY APPLN. INFO.: US 2002-163607
200206
05
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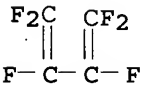
AB The invention provides a dielec. etch process with good etch rate, good selectivity with respect to photoresist mask, and much reduced striation as compared with conventional dielec. etching processes having comparable etch rate and selectivity. The dielec. layer is formed on a substrate with an underlying layer of another material and an overlying photoresist mask. A process for etching comprises introducing a novel process gas into a process zone and maintaining a plasma of the process gas for a period of time. The process gas comprises a fluorocarbon gas (e.g., CF4, C2F6, C3F8, C3F6, C4F6, C4F8, C4F10, CH3F, CHF3, C2HF5, CH2F2, and C2H4F2), oxygen, a hydrogen-containing gas (especially NH3), and, optionally, an inert gas.

IT **685-63-2**
RL: RGT (Reagent); RACT (Reactant or reagent)
(component of **plasma-etching gas**;
etching of dielec. layer with reduced striation using a fluorocarbon gas mixture)

RN 685-63-2 HCAPLUS
CN 1,3-Butadiene, 1,1,2,3,4,4-hexafluoro- (8CI, 9CI) (CA INDEX NAME)



IC ICM H01L021-302
ICS H01L021-461
INCL 438710000
CC 76-3 (Electric Phenomena)
ST dielec **etching** fluorocarbon **gas** striation
IT 75-10-5 75-37-6 75-46-7 115-25-3, Carbon fluoride (C4F8)
116-15-4 354-33-6 354-92-7 593-53-3, Methyl fluoride
685-63-2 1333-74-0, Hydrogen, reactions 7664-41-7, Ammonia, reactions 7782-44-7, Oxygen, reactions
RL: RGT (Reagent); RACT (Reactant or reagent)
(component of **plasma-etching gas**;
etching of dielec. layer with reduced striation using a fluorocarbon gas mixture)
IT 75-73-0, Carbon fluoride (CF4) 76-16-4 76-19-7
RL: RGT (Reagent); RACT (Reactant or reagent)
(component of **plasma-etching gas**;
plasma-etching of dielec. layer with reduced striation using a fluorocarbon gas mixture)

L35 ANSWER 3 OF 23 HCAPLUS COPYRIGHT 2006 ACS on STN
ACCESSION NUMBER: 2003:859305 HCAPLUS
DOCUMENT NUMBER: 140:330929
TITLE: Etching method for forming openings of various depths on silicon oxide dielectric layers
INVENTOR(S): Yang, Jian-Luen; Chen, Dung-Yu
PATENT ASSIGNEE(S): United Microelectronics Corp., Taiwan
SOURCE: Taiwan., 6 pp.

CODEN: TWXXA5
DOCUMENT TYPE: Patent
LANGUAGE: Chinese
FAMILY ACC. NUM. COUNT: 1
PATENT INFORMATION:

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
TW 445541	B	20010711	TW 1999-88100240	19990108

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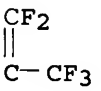
PRIORITY APPLN. INFO.: TW 1999-88100240 19990108

<--

AB This invention provides an etching method to form openings with various depths on Si oxide dielec. layer using high-d. plasma etching system. The **etching gas** source is the mixture of octafluorobutylene, difluoromethane and Ar gas, which is employed to etch the oxide dielec. layer to form several openings with the 1st depth. Then, mixture of octafluorobutylene, CO and Ar gas is used as the **etching gas** source to **etch** the oxide dielec. layer exposed by the openings with the 1st depth to deepen the depth into the 2nd depth. Finally, mixture of octafluorobutylene, difluoromethane, CO and Ar **gas** is used as **etching gas** source to **etch** the oxide dielec. layer exposed by the openings formed previously to further extend the opening depth into the 3rd and 4th depths.

IT **382-21-8**, Octafluoroisobutylene
RL: NUU (Other use, unclassified); PEP (Physical, engineering or chemical process); PYP (Physical process); PROC (Process); USES (Uses)
(**etchant**; **etching** method for forming openings of various depths on silicon oxide dielec. layers)

RN 382-21-8 HCAPLUS
CN 1-Propene, 1,1,3,3,3-pentafluoro-2-(trifluoromethyl)- (9CI) (CA INDEX NAME)



IC ICM H01L021-3065
CC 76-10 (Electric Phenomena)
IT 75-10-5, Difluoromethane **382-21-8**, Octafluoroisobutylene 630-08-0, Carbon monoxide, processes 7440-37-1, Argon, processes
RL: NUU (Other use, unclassified); PEP (Physical, engineering or chemical process); PYP (Physical process); PROC (Process); USES (Uses)
(**etchant**; **etching** method for forming openings of various depths on silicon oxide dielec. layers)

L35 ANSWER 4 OF 23 HCAPLUS COPYRIGHT 2006 ACS on STN
ACCESSION NUMBER: 2003:676806 HCAPLUS
DOCUMENT NUMBER: 139:372583
TITLE: The evaluation of hexafluoro-1,3-butadiene as an

environmentally benign dielectric etch chemistry in a medium-density etch chamber

AUTHOR(S): Chatterjee, R.; Reif, R.; Sparks, T.; Vartanian, V.; Goolsby, B.; Mendicino, L.

CORPORATE SOURCE: MIT Microsystems Technology Laboratories, Cambridge, MA, 02139, USA

SOURCE: Proceedings - Electrochemical Society (**2002**), 2002-15(Environmental Issues with Materials and Processes for the Electronics and Semiconductor Industries), 99-113
CODEN: PESODO; ISSN: 0161-6374

PUBLISHER: Electrochemical Society

DOCUMENT TYPE: Journal

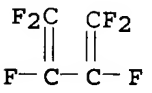
LANGUAGE: English

AB In an effort to develop alternative etch chemistries with a reduced environmental footprint, hexafluoro-1,3-butadiene (C4F6) was evaluated for global warming emissions and process performance on a medium-d. etch chamber for both Si oxide and organosilicate glass (OSG) films. The process and emissions results are compared to PFC-based processes. For oxide etching, global warming emissions reduction ≤82% were attained compared to a c-C4F8-based process, with similar process performance achieved. For the c-C4F8 process, >60% of the total emissions are due to unreacted c-C4F8, a high-GWP feed gas. By simply switching to a low-GWP gas like C4F6, the emissions from unreacted feed gas are eliminated. The C4F6 process resulted in lower CHF3 emissions, which is likely due to lower photoresist erosion, as photoresist is a source of H for the formation of CHF3. In the case of OSG etching, 65% reduction in global warming emissions was possible compared to a c-C4F8 process, with comparable process performance.

IT **685-63-2**, Hexafluoro-1,3-butadiene
RL: CPS (Chemical process); NUU (Other use, unclassified); PEP (Physical, engineering or chemical process); PRP (Properties); PROC (Process); USES (Uses)
(use of hexafluorobutadiene as environmentally benign dielec. **etch** chemical in medium-d. **etch** chamber)

RN 685-63-2 HCAPLUS

CN 1,3-Butadiene, 1,1,2,3,4,4-hexafluoro- (8CI, 9CI) (CA INDEX NAME)



CC 76-3 (Electric Phenomena)
Section cross-reference(s): 48, 59, 66

ST perfluorobutadiene cleaning **etching** dielec film greenhouse **gas**

IT **685-63-2**, Hexafluoro-1,3-butadiene
RL: CPS (Chemical process); NUU (Other use, unclassified); PEP (Physical, engineering or chemical process); PRP (Properties); PROC (Process); USES (Uses)
(use of hexafluorobutadiene as environmentally benign dielec. **etch** chemical in medium-d. **etch** chamber)

REFERENCE COUNT: 33 THERE ARE 33 CITED REFERENCES AVAILABLE FOR THIS RECORD. ALL CITATIONS AVAILABLE IN THE RE FORMAT

L35 ANSWER 5 OF 23 HCAPLUS COPYRIGHT 2006 ACS on STN

ACCESSION NUMBER: 2003:605125 HCAPLUS
DOCUMENT NUMBER: 139:142298
TITLE: Method of plasma etching an oxide layer using fluorocarbon etchants
INVENTOR(S): Hung, Hoiman; Caulfield, Joseph P.; Shan, Hongqing; Wang, Ruiping; Yin, Gerald Z.
PATENT ASSIGNEE(S): Applied Materials, Inc., USA
SOURCE: U.S., 20 pp., Cont.-in-part of U.S. 6,174,451. CODEN: USXXAM
DOCUMENT TYPE: Patent
LANGUAGE: English
FAMILY ACC. NUM. COUNT: 7
PATENT INFORMATION:

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
US 6602434	B1	20030805	US 1999-440810 <--	19991115
US 6183655	B1	20010206	US 1998-49862 <--	19980327
US 6174451	B1	20010116	US 1998-193056 <--	19981116

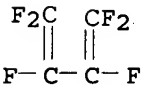
PRIORITY APPLN. INFO.:

US 1998-49862	A2	19980327
US 1998-193056	A2	19981116
US 1997-933804	A2	19970919
US 1997-964504	A2	19971105

AB The invention relates to a method of plasma etching an oxide layer using fluorocarbon etchants. The etching process consists of the steps of (i) flowing into a plasma reaction chamber an **etching gas** mixture consisting of a first amount of a heavy fluorocarbon selected from the group consisting of hexafluorobutadiene, hexafluorocyclobutene, and hexafluorobenzene, a second amount of a chemical inactive gas being at least equal to the first amount, and a third amount of a hydrofluoromethane having no more than two hydrogen atoms; (ii) radio-frequency biasing a pedestal electrode supporting the substrate having an oxide layer overlying a non-oxide layer; and (iii) exciting the **etching gas** mixture into a plasma to thereby etch the oxide layer selectively to the non-oxide layer.

IT **685-63-2**
RL: NUU (Other use, unclassified); PEP (Physical, engineering or

chemical process); PYP (Physical process); PROC (Process); USES (Uses)
(**etchant**; method of **plasma etching** an oxide layer using fluorocarbon **etchants**)
RN 685-63-2 HCAPLUS
CN 1,3-Butadiene, 1,1,2,3,4,4-hexafluoro- (8CI, 9CI) (CA INDEX NAME)



IC ICM H01L021-3065
INCL 216039000; 216067000; 216072000; 216079000; 438714000; 438723000
CC 76-11 (Electric Phenomena)
IT 75-10-5, Difluoromethane 75-46-7, Trifluoromethane 75-73-0, Tetrafluoromethane 115-25-3, Octafluorocyclobutane 392-56-3, Hexafluorobenzene 559-40-0, Octafluorocyclopentene 661-54-1 **685-63-2** 697-11-0, Hexafluorocyclobutene 37145-46-3, Pentafluoropropene
RL: NUU (Other use, unclassified); PEP (Physical, engineering or chemical process); PYP (Physical process); PROC (Process); USES (Uses)
(**etchant**; method of **plasma etching** an oxide layer using fluorocarbon **etchants**)
IT 7440-37-1, Argon, processes 7782-44-7, Oxygen, processes
RL: NUU (Other use, unclassified); PEP (Physical, engineering or chemical process); PYP (Physical process); PROC (Process); USES (Uses)
(**etching** process **gas**; method of **plasma etching** an oxide layer using fluorocarbon etchants)
REFERENCE COUNT: 29 THERE ARE 29 CITED REFERENCES AVAILABLE FOR THIS RECORD. ALL CITATIONS AVAILABLE IN THE RE FORMAT

L35 ANSWER 6 OF 23 HCAPLUS COPYRIGHT 2006 ACS on STN
ACCESSION NUMBER: 2003:568978 HCAPLUS
DOCUMENT NUMBER: 139:142056
TITLE: Alignment marks and fabrication of semiconductor devices
INVENTOR(S): Yamagishi, Nobuhisa
PATENT ASSIGNEE(S): Sony Corp., Japan
SOURCE: Jpn. Kokai Tokkyo Koho, 13 pp.
CODEN: JKXXAF
DOCUMENT TYPE: Patent
LANGUAGE: Japanese
FAMILY ACC. NUM. COUNT: 1
PATENT INFORMATION:

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
JP 2003209037	A2	20030725	JP 2002-4595	200201 11

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PRIORITY APPLN. INFO.: JP 2002-4595 200201

11

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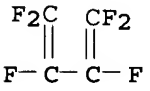
AB In the fabrication of semiconductor devices, and on formation of via holes which perforate low-k interlayer dielecs. of SiO films containing C and H, which may be SiOCH films, alignment marks are formed by etching the interlayer dielecs. in the same etching process for formation of the via holes, wherein the alignment marks are assemblies of dot patterns with size 1-2.5 times the diameter of the via holes, or assemblies of arrays of band patterns with width 1-2.5 times of the diameter of the via holes. The etching process will be run by using mixed gases of fluorocarbon gases, inert gases, and N2 or O2. In the single or dual damascene method, the etching process is composed of main etching step using a mixed gas containing CHF3 or CH2F2, inert gases, and N2 or O2 and over-etching step using a mixed gas containing C4F6, C4F8, or C5F8, inert gases, and N2 or O2. If a SiC film or SiN film is provided on the SiOCH film as a top layer, and if a SiC film or SiN film is provided under the SiOCH film as an etching stopper layer, a mixed gas containing CHF3 or CH2F2, inert gases, and N2 or O2 is employed to etch the SiC or SiN film.

IT **685-63-2**
RL: NUU (Other use, unclassified); USES (Uses)
(**etching gas** containing; formation of alignment marks and via holes in same **etching** process and fabrication of semiconductor devices)

RN 685-63-2 HCAPLUS

CN 1,3-Butadiene, 1,1,2,3,4,4-hexafluoro- (8CI, 9CI) (CA INDEX NAME)



IC ICM H01L021-027
ICS G03F009-00; H01L021-28; H01L021-3065; H01L021-768; H01L021-82

CC 76-3 (Electric Phenomena)

IT Noble **gases**, uses
RL: NUU (Other use, unclassified); USES (Uses)
(**etching gas** containing; formation of alignment marks and via holes in same etching process and fabrication of semiconductor devices)

IT Hydrocarbons, uses
RL: NUU (Other use, unclassified); USES (Uses)
(fluoro, **etching gas** containing; formation of alignment marks and via holes in same etching process and fabrication of semiconductor devices)

IT 75-10-5, Difluoromethane 75-46-7, Trifluoromethane 115-25-3, Octafluorocyclobutane 559-40-0, Octafluorocyclopentene **685-63-2** 7727-37-9, Nitrogen, uses 7782-44-7, Oxygen, uses
RL: NUU (Other use, unclassified); USES (Uses)
(**etching gas** containing; formation of alignment marks and via holes in same **etching** process and fabrication of semiconductor devices)

L35 ANSWER 7 OF 23 HCAPLUS COPYRIGHT 2006 ACS on STN
ACCESSION NUMBER: 2003:491543 HCAPLUS
DOCUMENT NUMBER: 139:61584
TITLE: Method of plasma etching a self-aligned contact with high sensitivity to a nitride shoulder

using a fluorocarbon etchant

INVENTOR(S): Joshi, Ajey M.; Ng, Pui Man Agnes; Stinnett, James A.; Dadu, Usama; Regis, Jason

PATENT ASSIGNEE(S): Applied Materials, Inc., USA

SOURCE: PCT Int. Appl., 34 pp.
CODEN: PIXXD2

DOCUMENT TYPE: Patent

LANGUAGE: English

FAMILY ACC. NUM. COUNT: 1

PATENT INFORMATION:

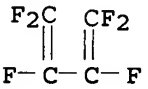
PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
WO 2003052808	A2	20030626	WO 2002-US39906	200212 12
			<--	
WO 2003052808	A3	20040415		
W: AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NO, NZ, OM, PH, PL, PT, RO, RU, SD, SE, SG, SK, SL, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VN, YU, ZA, ZM, ZW				
RW: GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZM, ZW, AM, AZ, BY, KG, KZ, MD, RU, TJ, TM, AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE, SI, SK, TR, BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG				
AU 2002353145	A1	20030630	AU 2002-353145	200212 12
			<--	
CN 1605117	A	20050406	CN 2002-824978	200212 12
			<--	
JP 2006501634	T2	20060112	JP 2003-553608	200212 12
			<--	
US 2006051968	A1	20060309	US 2005-498857	200501 06
			<--	
PRIORITY APPLN. INFO.:			US 2001-341135P P	200112 13
			<--	
			WO 2002-US39906 W	200212 12
			<--	

AB The invention relates to a method of plasma etching a self-aligned contact with high sensitivity to a nitride shoulder using a fluorocarbon etchant. The plasmas are based on mixts. of a first gas having the formula CaFb, and a second gas having the formula CxHyFz, where a/b ≥ 2/3, and where x/z ≥ 1/2. The mixts. are used in low or medium d. plasmas sustained in a

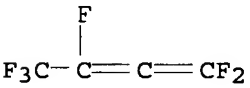
magnetically enhanced reactive ion chamber to provide a process that exhibits excellent corner layer selectivity, photoresist selectivity, underlayer selectivity, and profile and bottom CD control. The percentages of the first and second **gas** are varied during **etching** to provide a plasma that etches undoped oxide films or to provide an etch stop on such films.

IT **685-63-2**, Hexafluoro-1,3-butadiene **29777-04-6**, Hexafluoro-1,2-Butadiene
RL: NUU (Other use, unclassified); PEP (Physical, engineering or chemical process); PYP (Physical process); PROC (Process); USES (Uses)
(**etchant**; method of **plasma etching** a self-aligned contact with high sensitivity to a nitride shoulder using a fluorocarbon **etchant**)

RN 685-63-2 HCAPLUS
CN 1,3-Butadiene, 1,1,2,3,4,4-hexafluoro- (8CI, 9CI) (CA INDEX NAME)



RN 29777-04-6 HCAPLUS
CN 1,2-Butadiene, 1,1,3,4,4,4-hexafluoro- (8CI, 9CI) (CA INDEX NAME)



IC ICM H01L021-311
CC 76-11 (Electric Phenomena)
Section cross-reference(s): 38

IT 75-10-5, Difluoromethane 359-35-3, Freon 134 593-53-3, Fluoromethane 630-08-0, Carbon monoxide, processes **685-63-2**, Hexafluoro-1,3-butadiene 811-97-2, Freon 134A 7782-44-7, Oxygen, processes **29777-04-6**, Hexafluoro-1,2-Butadiene
RL: NUU (Other use, unclassified); PEP (Physical, engineering or chemical process); PYP (Physical process); PROC (Process); USES (Uses)
(**etchant**; method of **plasma etching** a self-aligned contact with high sensitivity to a nitride shoulder using a fluorocarbon **etchant**)

IT 7440-37-1, Argon, processes
RL: NUU (Other use, unclassified); PEP (Physical, engineering or chemical process); PYP (Physical process); PROC (Process); USES (Uses)
(**etching** process **gas**; method of **plasma etching** a self-aligned contact with high sensitivity to a nitride shoulder using a fluorocarbon etchant)

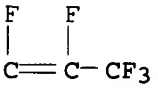
L35 ANSWER 8 OF 23 HCAPLUS COPYRIGHT 2006 ACS on STN
ACCESSION NUMBER: 2003:5443 HCAPLUS
DOCUMENT NUMBER: 138:47329
TITLE: High resist-selectivity etch for silicon trench etch applications
INVENTOR(S): Deshmukh, Shashank; Mui, David; Chinn, Jeffrey

D.; Podlesnik, Dragan V.
PATENT ASSIGNEE(S): Applied Materials, Inc., USA
SOURCE: U.S. Pat. Appl. Publ., 7 pp.
CODEN: USXXCO
DOCUMENT TYPE: Patent
LANGUAGE: English
FAMILY ACC. NUM. COUNT: 1
PATENT INFORMATION:

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
US 2003003752	A1	20030102	US 2001-893859	200106 27
			<--	
US 6653237	B2	20031125		
PRIORITY APPLN. INFO.:			US 2001-893859	200106 27
			<--	

AB Processes for forming trenches within silicon substrates are described. According to an embodiment of the invention, a masked substrate is initially provided that comprises (a) a silicon substrate and (b) a patterned resist layer over the silicon substrate. The patterned resist layer has one or more apertures formed in it. Subsequently, a trench is formed in the substrate through the apertures in the resist layer by an inductive plasma-etching step, which is conducted using plasma source gases that comprise SF6, at least one fluorocarbon gas, and N2. If desired, Cl2 can also be provided in addition to the above source gases. The process of the present invention produces chamber deposits in low amts., while providing high etching rates, high silicon : resist selectivities, and good trench sidewall profile control.

IT **360-89-4**
RL: TEM (Technical or engineered material use); USES (Uses)
(plasma source **gas**; high resist-selectivity **etch** for silicon trench **etch** applications)
RN 360-89-4 HCAPLUS
CN 2-Butene, 1,1,1,2,3,4,4,4-octafluoro- (8CI, 9CI) (CA INDEX NAME)



IC ICM H01L021-311
INCL 438700000
CC 74-5 (Radiation Chemistry, Photochemistry, and Photographic and Other Reprographic Processes)
ST photoresist **plasma etching** source **gas** silicon trench
IT Hydrocarbons, uses
RL: TEM (Technical or engineered material use); USES (Uses)
(fluoro, plasma source **gas**; high resist-selectivity **etch** for silicon trench etch applications)
IT 75-10-5, Difluoromethane 75-46-7, Trifluoromethane **360-89-4** 2551-62-4, Sulfur fluoride (SF6) 7727-37-9,

Nitrogen, uses 16887-00-6, Chloride, uses
RL: TEM (Technical or engineered material use); USES (Uses)
(plasma source **gas**; high resist-selectivity **etch** for silicon trench **etch** applications)

L35 ANSWER 9 OF 23 HCAPLUS COPYRIGHT 2006 ACS on STN
ACCESSION NUMBER: 2002:755176 HCAPLUS
DOCUMENT NUMBER: 137:287659
TITLE: Plasma etching of dielectric layer with selectivity to stop layer
INVENTOR(S): Chien, Ting; Nelson, Christine; Keil, Douglas
PATENT ASSIGNEE(S): USA
SOURCE: U.S. Pat. Appl. Publ., 14 pp.
CODEN: USXXCO
DOCUMENT TYPE: Patent
LANGUAGE: English
FAMILY ACC. NUM. COUNT: 1
PATENT INFORMATION:

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
US 2002142610	A1	20021003	US 2001-820692	200103 30

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PRIORITY APPLN. INFO.: US 2001-820692 200103 30

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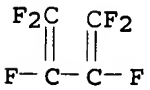
AB A semiconductor manufacturing process in which a dielec. layer is plasma etched with selectivity to an underlying and/or overlying stop layer such as a Si nitride layer. The **etchant gas** includes a H-free fluorocarbon reactant such as CxFy gas in which $y/x \leq 1.5$, an O-containing gas such as O2 and a carrier gas such as Ar. The etch rate of the dielec. layer can be ≥10 times higher than that of the stop layer. Using a combination of C4F6, O2 and Ar, it is possible to obtain dielec.: nitride etch selectivity of >30:1 and nitride cornering etch selectivity of >20:1. The process is useful for etching vias, contacts, and/or trenches of a self-aligned contact (SAC) or self-aligned trench.

IT **685-63-2**, 1,1,2,3,4,4-Hexafluoro-1,3-Butadiene
RL: NUU (Other use, unclassified); PEP (Physical, engineering or chemical process); PYP (Physical process); PROC (Process); USES (Uses)
(**etchant**; **plasma etching** of dielec. layer with selectivity to stop layer)

RN 685-63-2 HCAPLUS
CN 1,3-Butadiene, 1,1,2,3,4,4-hexafluoro- (8CI, 9CI) (CA INDEX NAME)



IC ICM H01L021-302
ICS H01L021-461
INCL 438710000
CC 76-10 (Electric Phenomena)

IT 630-08-0, Carbon monoxide, processes **685-63-2**, 1,1,2,3,4,4-Hexafluoro-1,3-Butadiene 697-11-0, HexafluoroCyclobutene 7440-37-1, Argon, processes 7782-44-7, Oxygen, processes
RL: NUU (Other use, unclassified); PEP (Physical, engineering or chemical process); PYP (Physical process); PROC (Process); USES (Uses)
(**etchant; plasma etching** of dielec. layer with selectivity to stop layer)

L35 ANSWER 10 OF 23 HCAPLUS COPYRIGHT 2006 ACS on STN
ACCESSION NUMBER: 2002:609870 HCAPLUS
DOCUMENT NUMBER: 137:162311
TITLE: Oxide dielectric plasma etching process reducing striations and maintaining critical dimensions in integrated circuit fabrication
INVENTOR(S): Ding, Ji; Kojiri, Hidehiro; Ishikawa, Yoshio; Horioka, Keiji; Wang, Ruiping; Wu, Robert W.; Hung, Hoiman
PATENT ASSIGNEE(S): Applied Materials, Inc., USA
SOURCE: U.S., 8 pp.
CODEN: USXXAM
DOCUMENT TYPE: Patent
LANGUAGE: English
FAMILY ACC. NUM. COUNT: 1
PATENT INFORMATION:

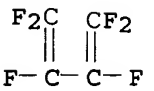
PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
US 6432318	B1	20020813	US 2000-506112 <--	20000217
US 2003036287	A1	20030220	US 2002-165249 <--	20020607
US 6800213	B2	20041005		
PRIORITY APPLN. INFO.:			US 2000-506112 A3 <--	20000217

AB A systematic oxide plasma etching recipe includes a heavy perfluorocarbon having F/C ratios <2 such as C4F6 or C5F8, an O-containing gas such as O2, CO or CO2, a lighter fluorocarbon or hydrofluorocarbon, and a noble diluent gas such as Ar or Xe. The amts. of the 1st three gases are chosen such that the ratio (F-H)/(C-O) is at least 1.5 and ≤2. Alternatively, the gas mixture may include the heavy fluorocarbon, C tetrafluoride, and the diluent with the ratio of the 1st two chosen such the ratio F/C is 1.5-2.

IT **685-63-2**
RL: CPS (Chemical process); NUU (Other use, unclassified); PEP (Physical, engineering or chemical process); PROC (Process); USES (Uses)
(oxide dielec. **plasma etching** process reducing striations and maintaining critical dimensions in integrated circuit fabrication)

RN 685-63-2 HCAPLUS

CN 1,3-Butadiene, 1,1,2,3,4,4-hexafluoro- (8CI, 9CI) (CA INDEX NAME)



IC ICM H01L021-3065
INCL 216067000
CC 76-3 (Electric Phenomena)
IT Noble gases, uses
RL: NUU (Other use, unclassified); USES (Uses)
(dilutent **gas**; oxide dielec. **plasma** **etching** process reducing striations and maintaining critical dimensions in integrated circuit fabrication)
IT Mixtures
(**gaseous**; oxide dielec. **plasma** **etching** process reducing striations and maintaining critical dimensions in integrated circuit fabrication)
IT 7440-37-1, Argon, uses
RL: NUU (Other use, unclassified); USES (Uses)
(carrier **gas**; oxide dielec. **plasma** **etching** process reducing striations and maintaining critical dimensions in integrated circuit fabrication)
IT 75-10-5, Difluoromethane 75-46-7, Trifluoromethane 75-73-0, Carbon tetrafluoride 76-16-4, Perfluoroethane 115-25-3, Octafluorocyclobutane 630-08-0, Carbon monoxide, processes **685-63-2** 7782-44-7, Oxygen, processes 7782-44-7D, Oxygen, compds.
RL: CPS (Chemical process); NUU (Other use, unclassified); PEP (Physical, engineering or chemical process); PROC (Process); USES (Uses)
(oxide dielec. **plasma** **etching** process reducing striations and maintaining critical dimensions in integrated circuit fabrication)
REFERENCE COUNT: 15 THERE ARE 15 CITED REFERENCES AVAILABLE FOR THIS RECORD. ALL CITATIONS AVAILABLE IN THE RE FORMAT

L35 ANSWER 11 OF 23 HCAPLUS COPYRIGHT 2006 ACS on STN
ACCESSION NUMBER: 2002:367152 HCAPLUS
DOCUMENT NUMBER: 136:378351
TITLE: Process for etching oxide using a hexafluorobutadiene and manifesting a wide process window
INVENTOR(S): Hung, Hoiman; Caulfield, Joseph P.; Shan, Hongqing; Wang, Ruiping; Yin, Gerald Zheyao
PATENT ASSIGNEE(S): Applied Materials, Inc., USA
SOURCE: U.S., 18 pp., Cont.-in-part of U.S. 6,174,451.
CODEN: USXXAM
DOCUMENT TYPE: Patent
LANGUAGE: English
FAMILY ACC. NUM. COUNT: 7
PATENT INFORMATION:

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
US 6387287	B1	20020514	US 1999-276311	

				199903 25 <--
US 6183655	B1	20010206	US 1998-49862	199803 27 <--
US 6174451	B1	20010116	US 1998-193056	199811 16 <--
WO 2000030168	A1	20000525	WO 1999-US27158	199911 16 <--
W: JP, KR, US				
JP 2002530863	T2	20020917	JP 2000-583080	199911 16 <--
TW 574425	B	20040201	TW 1999-88119957	199911 16 <--
US 2003000913	A1	20030102	US 2002-144635	200205 13 <--
US 6849193	B2	20050201		

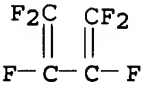
PRIORITY APPLN. INFO.:	US 1998-49862	A2	199803 27 <--
	US 1998-193056	A2	199811 16 <--
	US 1997-933804	A2	199709 19 <--
	US 1997-964504	A2	199711 05 <--
	US 1999-276311	A	199903 25 <--
	WO 1999-US27158	W	199911 16 <--

AB An oxide etching process, particularly useful for selectively etching oxide over a feature having a nonoxide composition, such as Si nitride and especially when that feature has a corner that is prone to faceting during the oxide etch. The invention uses 1 of 3 H-free fluorocarbons having a low F/C ratio, specifically hexafluorobutadiene (C4F6), hexafluorocyclobutene (C4F6), and hexafluorobenzene (C6F6). At least hexafluorobutadiene has a b.p.

below 10° and is com. available. The fluorocarbon together with a substantial amount of a noble gas such as Ar is excited into a high-d. plasma in a reactor which inductively couples plasma source power into the chamber and RF biases the pedestal electrode supporting the wafer. Preferably, 1 of 2 two-step etch process is used. In the 1st, the source and bias power are reduced towards the end of the etch. In the 2nd, the fluorocarbon is used in the main step to provide a good vertical profile and a more strongly polymerizing fluorocarbon such as difluoromethane (CH2F2) is added in the over etch to protect the nitride corner. The same chemical can be used in a magnetically enhanced reactive ion etcher (MERIE), preferably with an even larger amount of Ar.

IT **685-63-2**
RL: CPS (Chemical process); NUU (Other use, unclassified); PEP (Physical, engineering or chemical process); PROC (Process); USES (Uses)
(process for **etching** oxide using fluorocarbons such as hexafluorobutadiene and manifesting a wide process window)

RN 685-63-2 HCAPLUS
CN 1,3-Butadiene, 1,1,2,3,4,4-hexafluoro- (8CI, 9CI) (CA INDEX NAME)



IC ICM H01L021-3065
INCL 216067000
CC 76-3 (Electric Phenomena)
IT Noble **gases**, processes
RL: CPS (Chemical process); NUU (Other use, unclassified); PEP (Physical, engineering or chemical process); PROC (Process); USES (Uses)
(process for **etching** oxide using fluorocarbons such as hexafluorobutadiene and manifesting a wide process window)
IT 75-10-5, Difluoromethane 75-46-7, Trifluoromethane 392-56-3, Hexafluorobenzene 630-08-0, Carbon monoxide, processes **685-63-2** 697-11-0, Hexafluorocyclobutene 1333-74-0, Hydrogen, processes 7440-37-1, Argon, processes
RL: CPS (Chemical process); NUU (Other use, unclassified); PEP (Physical, engineering or chemical process); PROC (Process); USES (Uses)
(process for **etching** oxide using fluorocarbons such as hexafluorobutadiene and manifesting a wide process window)
REFERENCE COUNT: 26 THERE ARE 26 CITED REFERENCES AVAILABLE FOR THIS RECORD. ALL CITATIONS AVAILABLE IN THE RE FORMAT

L35 ANSWER 12 OF 23 HCAPLUS COPYRIGHT 2006 ACS on STN
ACCESSION NUMBER: 2002:353764 HCAPLUS
DOCUMENT NUMBER: 136:349378
TITLE: Method for structuring a silicon oxide layer by plasma exposure
INVENTOR(S): Goldbach, Matthias; Haussdoerfer, Bastian; Grahl, Ortrun
PATENT ASSIGNEE(S): Infineon Technologies Ag, Germany; Applied Materials, Inc.
SOURCE: PCT Int. Appl., 23 pp.
CODEN: PIXXD2

DOCUMENT TYPE: Patent
LANGUAGE: German
FAMILY ACC. NUM. COUNT: 1
PATENT INFORMATION:

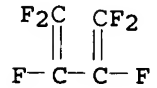
PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
WO 2002037549	A2	20020510	WO 2001-EP12538	20011030
WO 2002037549	A3	20021121		
W: US				
RW: AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE, TR				
DE 10053780	A1	20020516	DE 2000-10053780	20001030

PRIORITY APPLN. INFO.: DE 2000-10053780 A 20001030

AB The invention relates to a method for structuring a Si oxide layer. A substrate comprising a Si oxide layer with a mask is provided in a plasma reactor. The Si oxide layer is exposed to a plasma which is produced from an **etching gas** containing at least one fluorocarbon compound that is selected from the group consisting of compds. of the empirical formula CxHyFz, in which x = 1-5, y = 0-4 and z = 2-10. The process is optimized by direct switching between the etching and deposition modes, which is achieved by varying the p.d. between the substrate and the plasma.

IT **685-63-2**
RL: NUU (Other use, unclassified); PEP (Physical, engineering or chemical process); PYP (Physical process); PROC (Process); USES (Uses)
(**plasma etchant**; method for structuring a silicon oxide layer by plasma exposure)

RN 685-63-2 HCAPLUS
CN 1,3-Butadiene, 1,1,2,3,4,4-hexafluoro- (8CI, 9CI) (CA INDEX NAME)



IC ICM H01L021-311
CC 76-11 (Electric Phenomena)
IT 75-10-5, Difluoromethane 75-73-0, Tetrafluoromethane 76-16-4, Hexafluoroethane 76-19-7, Octafluoropropane 115-25-3, Octafluorocyclobutane 116-14-3, Tetrafluoroethene, processes 354-33-6, Pentafluoroethane 355-25-9, Decafluorobutane 359-11-5, Trifluoroethene 559-40-0, Octafluorocyclopentene 593-53-3, Fluoromethane **685-63-2** 697-11-0, Hexafluorocyclobutene 872-58-2, Pentafluorocyclopropane 931-91-9, Hexafluorocyclopropane 27070-61-7, Hexafluoropropane
RL: NUU (Other use, unclassified); PEP (Physical, engineering or chemical process); PYP (Physical process); PROC (Process); USES

(Uses)
(**plasma etchant**; method for structuring a silicon oxide layer by plasma exposure)

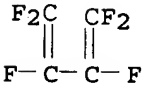
L35 ANSWER 13 OF 23 HCAPLUS COPYRIGHT 2006 ACS on STN
ACCESSION NUMBER: 2002:237342 HCAPLUS
DOCUMENT NUMBER: 136:271658
TITLE: Oxide/nitride one-step plasma etching having high selectivity to photoresist in integrated circuit fabrication
INVENTOR(S): Kim, Yungsang; Komatsu, Takehiko; Bjorkman, Claes H.; Shan, Hongqing
PATENT ASSIGNEE(S): Applied Materials, Inc., USA
SOURCE: U.S., 8 pp.
CODEN: USXXAM
DOCUMENT TYPE: Patent
LANGUAGE: English
FAMILY ACC. NUM. COUNT: 1
PATENT INFORMATION:

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
US 6362109	B1	20020326	US 2000-585632	20000602
			<--	
PRIORITY APPLN. INFO.:			US 2000-585632	20000602
			<--	

AB A single-step plasma etch process is claimed for etching both oxide and nitride selectively to photoresist and Si. The **etching gas** includes a fluorocarbon, difluoromethane, O, and CO. The fluorocarbon is preferably H-free. Preferred fluorocarbons are hexafluorobutadiene (C4F6), octafluorocyclobutane (C4F8), and C tetrafluoride (CF4), of which C4F6 is the most preferred. Approx. equal amts. are supplied of the fluorocarbon, difluoromethane, and O and a significantly larger amount of CO. The chemical is also applicable to etching organo silicate glass selectively to photoresist.

IT **685-63-2**
RL: CPS (Chemical process); NUU (Other use, unclassified); PEP (Physical, engineering or chemical process); PROC (Process); USES (Uses)
(oxide/nitride one-step **plasma etching** having high selectivity to photoresist in integrated circuit fabrication)

RN 685-63-2 HCAPLUS
CN 1,3-Butadiene, 1,1,2,3,4,4-hexafluoro- (8CI, 9CI) (CA INDEX NAME)



IC ICM H01L021-3065
INCL 438706000
CC 76-3 (Electric Phenomena)
Section cross-reference(s): 57

IT 75-10-5, Difluoromethane 75-73-0, Carbon tetrafluoride 115-25-3, Octafluorocyclobutane 559-40-0, Perfluorocyclopentene 630-08-0, Carbon monoxide, processes **685-63-2** 7782-44-7, Oxygen, processes 334490-97-0, Black Diamond 339984-98-4, CORAL (barrier film)
RL: CPS (Chemical process); NUU (Other use, unclassified); PEP (Physical, engineering or chemical process); PROC (Process); USES (Uses)
(oxide/nitride one-step **plasma etching** having high selectivity to photoresist in integrated circuit fabrication)

REFERENCE COUNT: 4 THERE ARE 4 CITED REFERENCES AVAILABLE FOR THIS RECORD. ALL CITATIONS AVAILABLE IN THE RE FORMAT

L35 ANSWER 14 OF 23 HCAPLUS COPYRIGHT 2006 ACS on STN
ACCESSION NUMBER: 2002:193495 HCAPLUS
DOCUMENT NUMBER: 136:240060
TITLE: Semiconductor device fabrication by plasma etching of silicon oxide film using octafluorobutene gas and semiconductor device itself
INVENTOR(S): Kang, Chang Jin
PATENT ASSIGNEE(S): Samsung Electronics Co., Ltd., S. Korea
SOURCE: Jpn. Kokai Tokkyo Koho, 7 pp.
CODEN: JKXXAF
DOCUMENT TYPE: Patent
LANGUAGE: Japanese
FAMILY ACC. NUM. COUNT: 1
PATENT INFORMATION:

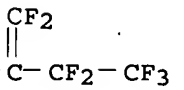
PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
JP 2002075975	A2	20020315	JP 2001-227553 <--	20010727
KR 2002017182	A	20020307	KR 2000-50358 <--	20000829
US 2002045353	A1	20020418	US 2001-865585 <--	20010529
PRIORITY APPLN. INFO.:			KR 2000-50358 A <--	20000829

AB The title method involves using a **plasma-etching gas** containing a linear unsatd. compound of octafluorobutene. Specifically, the octafluorobutene may comprise octafluoro-1-butene or octafluoro-2-butene, and the silicon oxide film may comprises silica, borophosphosilicate glass, phosphosilicate glass, or silicon nitride oxide. Addnl., the **etching gas** may contain CF4, C2F6, C3F6, C3F8, C5F8, octafluorocyclobutane, CHF3, CH2F2, CH3F, Ar, He, Kr, Xe, or O2.

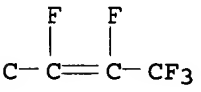
IT **357-26-6**, Octafluoro-1-butene **360-89-4**, Octafluoro-2-butene

RL: NUU (Other use, unclassified); USES (Uses)
(semiconductor device fabrication by **plasma etching** of silicon oxide film using fluorobutene gas and semiconductor device itself)

RN 357-26-6 HCAPLUS
CN 1-Butene, 1,1,2,3,3,4,4,4-octafluoro- (8CI, 9CI) (CA INDEX NAME)



RN 360-89-4 HCAPLUS
CN 2-Butene, 1,1,1,2,3,4,4,4-octafluoro- (8CI, 9CI) (CA INDEX NAME)



IC ICM H01L021-3065
ICS H01L021-28; H01L021-768
CC 76-3 (Electric Phenomena)
IT 75-10-5, Difluoromethane 75-46-7, Trifluoromethane 75-73-0, Carbon fluoride (CF4) 76-16-4 76-19-7 115-25-3, Octafluorocyclobutane 116-15-4, Perfluoropropene **357-26-6**, Octafluoro-1-butene **360-89-4**, Octafluoro-2-butene 559-40-0, Perfluorocyclopentene 593-53-3, Methyl fluoride 7439-90-9, Krypton, uses 7440-37-1, Argon, uses 7440-59-7, Helium, uses 7440-63-3, Xenon, uses 7782-44-7, Oxygen, uses
RL: NUU (Other use, unclassified); USES (Uses)
(semiconductor device fabrication by **plasma etching** of silicon oxide film using fluorobutene gas and semiconductor device itself)

L35 ANSWER 15 OF 23 HCAPLUS COPYRIGHT 2006 ACS on STN
ACCESSION NUMBER: 2002:185482 HCAPLUS
DOCUMENT NUMBER: 136:255880
TITLE: Dry **etching gas** and method for dry etching
INVENTOR(S): Hirose, Masataka; Nakamura, Shingo; Itano, Mitsushi; Aoyama, Hirokazu
PATENT ASSIGNEE(S): Daikin Industries, Ltd., Japan
SOURCE: PCT Int. Appl., 18 pp.
CODEN: PIXXD2
DOCUMENT TYPE: Patent
LANGUAGE: Japanese
FAMILY ACC. NUM. COUNT: 1
PATENT INFORMATION:

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
WO 2002021586	A1	20020314	WO 2001-JP7678	200109 05

<--

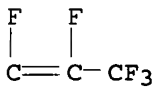
W: JP, KR, US

TW 507289	B	20021021	TW 2001-90122127 <--	200109 06
US 2004011763	A1	20040122	US 2003-362973 <--	200303 06
PRIORITY APPLN. INFO.:			JP 2000-271709 <--	A 200009 07
			WO 2001-JP7678 <--	W 200109 05

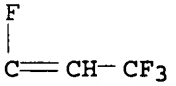
AB A dry **etching gas** which comprises a compound having a CF3CF fragment directly bonded with a double bond (provided that the compound is exclusive of CF3CF=CFCF=CF2). Said dry **etching gas** permits the formation of a pattern such as a contact hole which has a high aspect ratio.

IT **360-89-4 760-42-9 2070-70-4 72804-49-0 86154-61-2 403855-46-9 403855-47-0 403855-48-1 403855-49-2 403855-50-5**
RL: NUU (Other use, unclassified); PRP (Properties); RCT (Reactant); RACT (Reactant or reagent); USES (Uses)
(**etchant**; dry **etching gas** and method for dry **etching**)

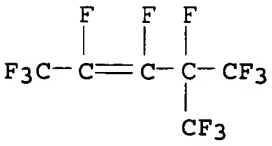
RN 360-89-4 HCAPLUS
CN 2-Butene, 1,1,1,2,3,4,4,4-octafluoro- (8CI, 9CI) (CA INDEX NAME)



RN 760-42-9 HCAPLUS
CN 2-Butene, 1,1,1,2,4,4,4-heptafluoro- (7CI, 8CI, 9CI) (CA INDEX NAME)



RN 2070-70-4 HCAPLUS
CN 2-Pentene, 1,1,1,2,3,4,5,5,5-nonafluoro-4-(trifluoromethyl)- (8CI, 9CI) (CA INDEX NAME)



RN 72804-49-0 HCAPLUS
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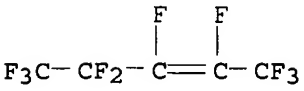
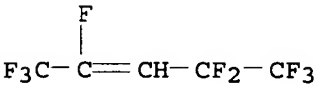
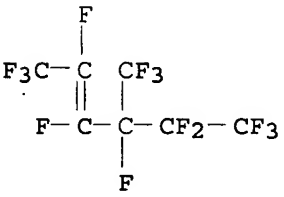


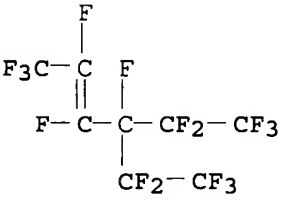
RN 86154-61-2 HCAPLUS
CN 2-Pentene, 1,1,1,2,4,4,5,5,5-nonafluoro- (9CI) (CA INDEX NAME)



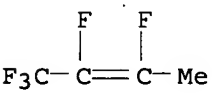
RN 403855-46-9 HCAPLUS
CN 2-Hexene, 1,1,1,2,3,4,5,5,6,6,6-undecafluoro-4-(trifluoromethyl)-
(9CI) (CA INDEX NAME)



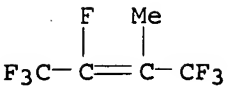
RN 403855-47-0 HCAPLUS
CN 2-Hexene, 1,1,1,2,3,4,5,5,6,6,6-undecafluoro-4-(pentafluoroethyl)-
(9CI) (CA INDEX NAME)



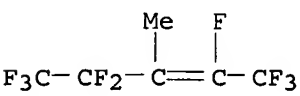
RN 403855-48-1 HCAPLUS
CN 2-Butene, 1,1,1,2,3-pentafluoro- (9CI) (CA INDEX NAME)



RN 403855-49-2 HCAPLUS
CN 2-Butene, 1,1,1,2,4,4,4-heptafluoro-3-methyl- (9CI) (CA INDEX NAME)



RN 403855-50-5 HCAPLUS
CN 2-Pentene, 1,1,1,2,4,4,5,5,5-nonafluoro-3-methyl- (9CI) (CA INDEX NAME)



IC ICM H01L021-3065
CC 76-11 (Electric Phenomena)
IT Alkenes, properties
Hydrocarbons, properties
RL: PRP (Properties); RCT (Reactant); RACT (Reactant or reagent)
(fluoro, **etchants**; dry **etching gas** and method for dry etching)
IT 116-15-4 **360-89-4** 754-12-1 **760-42-9**
2070-70-4 2252-83-7 70002-97-0 **72804-49-0**
86154-61-2 403855-46-9 403855-47-0
403855-48-1 403855-49-2 403855-50-5
403855-51-6
RL: NUU (Other use, unclassified); PRP (Properties); RCT (Reactant); RACT (Reactant or reagent); USES (Uses)
(**etchant**; dry **etching gas** and method for dry **etching**)
IT 7631-86-9, Silica, properties
RL: NUU (Other use, unclassified); PEP (Physical, engineering or chemical process); PRP (Properties); PROC (Process); USES (Uses)
(etching of, **etchants** for; dry **etching gas** and method for dry etching)
REFERENCE COUNT: 7 THERE ARE 7 CITED REFERENCES AVAILABLE FOR THIS RECORD. ALL CITATIONS AVAILABLE IN THE RE FORMAT

L35 ANSWER 16 OF 23 HCAPLUS COPYRIGHT 2006 ACS on STN
ACCESSION NUMBER: 2002:48001 HCAPLUS
DOCUMENT NUMBER: 136:111165
TITLE: Dry **etching gases** and dry **etching** method
INVENTOR(S): Hirose, Masataka; Nakamura, Shingo; Itano, Atsushi; Aoyama, Hirokazu
PATENT ASSIGNEE(S): Daikin Industries, Ltd., Japan
SOURCE: Jpn. Kokai Tokkyo Koho, 11 pp.
CODEN: JKXXAF
DOCUMENT TYPE: Patent
LANGUAGE: Japanese
FAMILY ACC. NUM. COUNT: 1
PATENT INFORMATION:

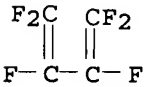
PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
JP 2002016050	A2	20020118	JP 2000-339908	

200011
08
<--
PRIORITY APPLN. INFO.: JP 2000-130477 A
200004
28
<--

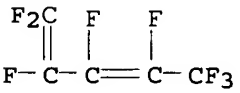
AB The gases comprise CF3CF=CFCF=CF2 and/or CF2=CFCF=CF2. SiO2 and/or SiN films are etched with the plasma of the gases selectively against resists and Si. Contact holes of high aspect ratio can be formed, and films with low dielec. constant can be etched satisfactorily.

IT **685-63-2 3109-88-4**
RL: RCT (Reactant); RACT (Reactant or reagent)
(plasma; dry **etching gases** and dry **etching** method in forming contact holes)

RN 685-63-2 HCAPLUS
CN 1,3-Butadiene, 1,1,2,3,4,4-hexafluoro- (8CI, 9CI) (CA INDEX NAME)



RN 3109-88-4 HCAPLUS
CN 1,3-Pentadiene, 1,1,2,3,4,5,5,5-octafluoro- (9CI) (CA INDEX NAME)



IC ICM H01L021-3065
ICS H01L021-28; H01L021-768
CC 76-3 (Electric Phenomena)
ST dry **etching gas** silica silicon nitride; **plasma etching gas** silica silicon nitride
IT Dielectric films
Electric contacts
Semiconductor device fabrication
(dry **etching gases** and dry **etching** method in forming contact holes)
IT **Etching**
(plasma; dry **etching gases** and dry **etching** method in forming contact holes)
IT 7631-86-9, Silica, processes 12033-89-5, Silicon nitride, processes
RL: DEV (Device component use); PEP (Physical, engineering or chemical process); PROC (Process); USES (Uses)
(dry **etching gases** and dry **etching** method in forming contact holes)
IT **685-63-2 3109-88-4** 7440-37-1, Argon, reactions
RL: RCT (Reactant); RACT (Reactant or reagent)
(plasma; dry **etching gases** and dry **etching** method in forming contact holes)

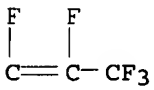
L35 ANSWER 17 OF 23 HCAPLUS COPYRIGHT 2006 ACS on STN

ACCESSION NUMBER: 2001:911494 HCAPLUS
DOCUMENT NUMBER: 136:286468
TITLE: Spun-on carbon antireflective layer with etch resistance for deep- and vacuum-ultraviolet lithography processes
AUTHOR(S): Sato, Yasuhiko; Onishi, Yasunobu; Nakano, Yoshihiko; Hayase, Shuzi
CORPORATE SOURCE: Process & Manufacturing Engineering Center, Toshiba Corporation, Shinsugita-cho, Isogo-ku, Yokohama, 235-8522, Japan
SOURCE: Journal of Vacuum Science & Technology, B: Microelectronics and Nanometer Structures (**2001**), 19(6), 2385-2388
CODEN: JVTBD9; ISSN: 0734-211X
PUBLISHER: American Institute of Physics
DOCUMENT TYPE: Journal
LANGUAGE: English

AB Dry etch resistance and antireflective performance were studied for a film containing a high amount of carbon (83.4 weight%), which was named the spun-on carbon film. The film was formed by using a carbon cluster precursor synthesized by reductive coupling of a mixture of carbon tetrabromide and phenylbromide. The refractive indexes of the spun-on carbon film at the exposure wavelengths of excimer lasers are n = 1.72, k = 0.35 (KrF), n = 1.46, k = 0.67 (ArF), and n = 1.37, k = 0.14 (F2). A bilayer bottom antireflective coating system composed of upper spun-on glass (SOG) and lower spun-on carbon was evaluated. By optimizing the SOG thickness, the reflectivity is reduced to 0.2% (KrF), 3.3% (ArF), and 0.5% (F2). Remarkable improvement is observed at the KrF and F2 wavelengths. Resist profiles are obtained without any footing, residue, or standing wave using the KrF and ArF scanning steppers. The etch resistance of the spun-on carbon film is 1.34 times greater than that of the thermally oxidized novolak film (i.e., a conventional underlayer for a trilevel resist process).

IT **360-89-4**
RL: NUU (Other use, unclassified); USES (Uses)
(**etching gas**; dry **etch** resistance and antireflective performance of spun-on carbon layer prepared from precursor produced by reductive coupling of carbon tetrabromide and phenylbromide for photolithog. bilayer BARC system)

RN 360-89-4 HCAPLUS
CN 2-Butene, 1,1,1,2,3,4,4,4-octafluoro- (8CI, 9CI) (CA INDEX NAME)



CC 74-5 (Radiation Chemistry, Photochemistry, and Photographic and Other Reprographic Processes)

IT **360-89-4** 630-08-0, Carbon monoxide, uses 7782-44-7, Oxygen, uses
RL: NUU (Other use, unclassified); USES (Uses)
(**etching gas**; dry **etch** resistance and antireflective performance of spun-on carbon layer prepared from precursor produced by reductive coupling of carbon tetrabromide and phenylbromide for photolithog. bilayer BARC system)

REFERENCE COUNT: 5 THERE ARE 5 CITED REFERENCES AVAILABLE FOR THIS RECORD. ALL CITATIONS AVAILABLE IN THE RE FORMAT

L35 ANSWER 18 OF 23 HCAPLUS COPYRIGHT 2006 ACS on STN
ACCESSION NUMBER: 2001:693591 HCAPLUS
DOCUMENT NUMBER: 135:250500
TITLE: Magnetically enhanced selective plasma etch process using a heavy fluorocarbon **etching gas** for dielectric oxides
INVENTOR(S): Liu, Jingbao; Komatsu, Takehiko; Shan, Hongqing; Horioka, Keiji; Pu, Bryan Y.
PATENT ASSIGNEE(S): Applied Materials, Inc., USA
SOURCE: PCT Int. Appl., 24 pp.
CODEN: PIXXD2
DOCUMENT TYPE: Patent
LANGUAGE: English
FAMILY ACC. NUM. COUNT: 1
PATENT INFORMATION:

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
WO 2001068939	A2	20010920	WO 2001-US40277	200103 09
			<--	
WO 2001068939	A3	20020530		
W: JP, KR				
US 6451703	B1	20020917	US 2000-522374	200003 10
			<--	
TW 538476	B	20030621	TW 2001-90105633	200103 09
			<--	
JP 2004512668	T2	20040422	JP 2001-567814	200103 09
			<--	
US 2002173162	A1	20021121	US 2002-144365	200205 13
			<--	
US 6613689	B2	20030902		

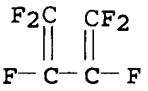
PRIORITY APPLN. INFO.:
US 2000-522374 A 200003 10
<--
WO 2001-US40277 W 200103 09
<--

AB An oxide etch process practiced in magnetically enhanced reactive ion etch (MERIE) plasma reactor. The **etching gas** includes approx. equal amts. of a H-free fluorocarbon, most preferably C4F6 (hexafluorobutadiene), and O and a much larger amount of Ar diluent gas. The magnetic field is preferably maintained

.gtorsim.50 G and the pressure at 40 millitorr or above with chamber residence times of <70 ms. A two-step process may be used for etching holes with very high aspect ratios. In the 2nd step, the magnetic field and the O flow are reduced. Other fluorocarbons may be substituted which have F/C ratios of <2 and more preferably ≤1.6 or 1.5.

IT **685-63-2**
RL: NUU (Other use, unclassified); RCT (Reactant); RACT (Reactant or reagent); USES (Uses)
(magnetically enhanced selective **plasma etch** process using heavy fluorocarbon **etching gas** for dielec. oxides)

RN 685-63-2 HCAPLUS
CN 1,3-Butadiene, 1,1,2,3,4,4-hexafluoro- (8CI, 9CI) (CA INDEX NAME)



IC ICM C23C016-00
CC 76-11 (Electric Phenomena)
Section cross-reference(s): 77
ST magnetic **plasma etching** fluorocarbon **gas** dielec oxide
IT Sputtering
(etching, reactive; magnetically enhanced selective plasma etch process using heavy fluorocarbon **etching gas** for dielec. oxides)
IT Electric insulators
Magnetic field effects
(magnetically enhanced selective plasma etch process using heavy fluorocarbon **etching gas** for dielec. oxides)
IT Perfluorocarbons
RL: NUU (Other use, unclassified); RCT (Reactant); RACT (Reactant or reagent); USES (Uses)
(magnetically enhanced selective plasma etch process using heavy fluorocarbon **etching gas** for dielec. oxides)
IT Oxides (inorganic), processes
RL: PEP (Physical, engineering or chemical process); RCT (Reactant); TEM (Technical or engineered material use); PROC (Process); RACT (Reactant or reagent); USES (Uses)
(magnetically enhanced selective plasma etch process using heavy fluorocarbon **etching gas** for dielec. oxides)
IT Etching
(plasma; magnetically enhanced selective plasma etch process using heavy fluorocarbon **etching gas** for dielec. oxides)
IT Etching
(sputter, reactive; magnetically enhanced selective plasma etch process using heavy fluorocarbon **etching gas** for dielec. oxides)
IT 7440-37-1, Argon, uses 7440-63-3, Xenon, uses
RL: NUU (Other use, unclassified); USES (Uses)
(magnetically enhanced selective plasma etch process using heavy fluorocarbon **etching gas** for dielec. oxides)
IT 630-08-0, Carbon monoxide, uses **685-63-2** 7782-44-7, Oxygen, uses
RL: NUU (Other use, unclassified); RCT (Reactant); RACT (Reactant or

reagent); USES (Uses)
(magnetically enhanced selective **plasma etch** process using heavy fluorocarbon **etching gas** for dielec. oxides)

L35 ANSWER 19 OF 23 HCAPLUS COPYRIGHT 2006 ACS on STN
ACCESSION NUMBER: 2001:43431 HCAPLUS
DOCUMENT NUMBER: 134:94381
TITLE: Oxide etch process using hexafluorobutadiene and related unsaturated hydrofluorocarbons
INVENTOR(S): Hung, Raymond; Caulfield, Joseph P.; Shan, Hongching; Wang, Ruiping; Yin, Gerald Z.
PATENT ASSIGNEE(S): Applied Materials, Inc., USA
SOURCE: U.S., 11 pp., Cont.-in-part of U.S. Ser. No. 49,862.
CODEN: USXXAM
DOCUMENT TYPE: Patent
LANGUAGE: English
FAMILY ACC. NUM. COUNT: 7
PATENT INFORMATION:

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
US 6174451	B1	20010116	US 1998-193056 <--	199811 16
US 6183655	B1	20010206	US 1998-49862 <--	199803 27
US 6387287	B1	20020514	US 1999-276311 <--	199903 25
US 6602434	B1	20030805	US 1999-440810 <--	199911 15
WO 2000030168	A1	20000525	WO 1999-US27158 <--	199911 16
W: JP, KR, US				
JP 2002530863	T2	20020917	JP 2000-583080 <--	199911 16
TW 574425	B	20040201	TW 1999-88119957 <--	199911 16
US 6613691	B1	20030902	US 2000-675360 <--	200009 29
PRIORITY APPLN. INFO.:			US 1998-49862 A2	199803 27

	<--	
US 1997-933804	A2	199709 19
	<--	
US 1997-964504	A2	199711 05
	<--	
US 1998-193056	A2	199811 16
	<--	
US 1999-276311	A	199903 25
	<--	
WO 1999-US27158	W	199911 16

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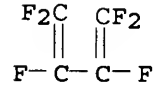
AB An oxide etching process, particular useful for selectively etching oxide over a feature having a nonoxide composition, such as silicon nitride and especially when that feature has a corner that is prone to faceting during the oxide etch. The invention uses one of three unsatd. 3- and 4-carbon fluorocarbons, specifically hexafluorobutadiene (C4F6), pentafluoropropylene (C3HF5), and trifluoropropyne (C3HF3), all of which have b.ps. <10°. and are com. available. The unsatd. hydrofluorocarbon together with argon is excited into a high-d. plasma in a reactor which inductively couples plasma source power into the chamber and RF biases the pedestal electrode supporting the wafer. Preferably, a two-step etch was used process was used in which the above **etching gas** was used in the main step to provide a good vertical profile and a more strongly polymerizing fluorocarbon such as difluoromethane (CH2F2) is added in the over etch to protect the nitride corner.

IT **685-63-2**
RL: RCT (Reactant); RACT (Reactant or reagent)
(oxide **etch** process using hexafluorobutadiene and related unsatd. hydrofluorocarbons for integrated circuit fabrication)

RN 685-63-2 HCAPLUS
CN 1,3-Butadiene, 1,1,2,3,4,4-hexafluoro- (8CI, 9CI) (CA INDEX NAME)



IC ICM H01L021-31
INCL 216067000
CC 76-3 (Electric Phenomena)
IT 75-10-5, Difluoromethane 661-54-1 **685-63-2** 202802-11-7
RL: RCT (Reactant); RACT (Reactant or reagent)
(oxide **etch** process using hexafluorobutadiene and related unsatd. hydrofluorocarbons for integrated circuit fabrication)
REFERENCE COUNT: 16 THERE ARE 16 CITED REFERENCES AVAILABLE

FOR THIS RECORD. ALL CITATIONS AVAILABLE IN THE RE FORMAT

L35 ANSWER 20 OF 23 HCAPLUS COPYRIGHT 2006 ACS on STN
ACCESSION NUMBER: 2000:909172 HCAPLUS
DOCUMENT NUMBER: 134:64983
TITLE: Method of forming salicide poly gate with thin gate oxide and ultra narrow gate width
INVENTOR(S): Tao, Hun-Jan; Tsai, Chia-Shiung
PATENT ASSIGNEE(S): Taiwan Semiconductor Manufacturing Company, Taiwan
SOURCE: U.S., 7 pp.
CODEN: USXXAM
DOCUMENT TYPE: Patent
LANGUAGE: English
FAMILY ACC. NUM. COUNT: 1
PATENT INFORMATION:

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
US 6165881	A	20001226	US 1998-177185	19981023

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PRIORITY APPLN. INFO.: US 1998-177185 19981023

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AB A method is achieved for removing a hard mask from a feature on a semiconductor wafer. The method comprises the following phases: depositing a buffer layer overall; etching back the buffer layer in an etching apparatus to expose the hard mask; etching the hard mask in the etching apparatus; and etching of the remaining buffer layer in the etching apparatus

IT **382-21-8**
RL: NUU (Other use, unclassified); PEP (Physical, engineering or chemical process); PROC (Process); USES (Uses)
(**etching gas**; forming salicide poly gate with thin gate oxide and ultra narrow gate width)

RN 382-21-8 HCAPLUS
CN 1-Propene, 1,1,3,3,3-pentafluoro-2-(trifluoromethyl)- (9CI) (CA INDEX NAME)

IC ICM H01L021-4763
INCL 438592000
CC 76-3 (Electric Phenomena)
Section cross-reference(s): 75
IT 76-16-4 **382-21-8** 7440-37-1, Argon, processes 7782-44-7, Oxygen, processes
RL: NUU (Other use, unclassified); PEP (Physical, engineering or chemical process); PROC (Process); USES (Uses)
(**etching gas**; forming salicide poly gate with thin gate oxide and ultra narrow gate width)

REFERENCE COUNT: 7 THERE ARE 7 CITED REFERENCES AVAILABLE FOR THIS RECORD. ALL CITATIONS AVAILABLE IN THE RE FORMAT

L35 ANSWER 21 OF 23 HCAPLUS COPYRIGHT 2006 ACS on STN
ACCESSION NUMBER: 2000:909171 HCAPLUS
DOCUMENT NUMBER: 134:64982
TITLE: Double spacer technology for making self-aligned contacts (SAC) on semiconductor integrated circuits
INVENTOR(S): Yaung, Dun-Nian; Wuu, Shou-Gwo; Chao, Li-Chih; Huang, Kuo Ching
PATENT ASSIGNEE(S): Taiwan Semiconductor Manufacturing Company, Taiwan
SOURCE: U.S., 13 pp.
CODEN: USXXAM
DOCUMENT TYPE: Patent
LANGUAGE: English
FAMILY ACC. NUM. COUNT: 1
PATENT INFORMATION:

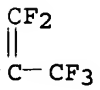
PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
US 6165880	A	20001226	US 1998-94869	19980615
PRIORITY APPLN. INFO.:			US 1998-94869	19980615

AB A method was achieved for making improved self-aligned contacts (SAC) to a patterned polysilicon layer, such as gate electrodes for FETs. Lightly doped source/drain areas are implanted. A second insulating layer is deposited and etched back to form first sidewall spacers. A Si nitride etch-stop layer and a first interpolysilicon oxide (IPO1) layer are deposited. First SAC openings are etched in the IPO1 layer to the etch-stop layer, and concurrently openings are etched for the gate electrodes, eliminating a masking step. The etch-stop layer is etched in the SAC openings to form second sidewall spacers that protect the first sidewall spacers during BOE cleaning of the contacts. A patterned polycide layer is used to make SACs and elec. interconnections. A second IPO layer is deposited to provide insulation, and an interlevel dielec. layer is deposited. Second SAC openings are etched to the etch-stop layer for the next level of metal interconnections, while the contact openings to the gate electrodes are etched to completion. The etch-stop layer is etched in the second SAC openings to form second sidewall spacers to protect the first sidewall spacers during cleaning. Metal plugs are formed from a first metal in the second SAC openings and in the openings to the gate electrodes. A second metal is patterned to complete the structure to the first level of metal interconnections.

IT **382-21-8**
RL: PEP (Physical, engineering or chemical process); PROC (Process)
(**plasma etching gas**; double spacer technol. for making self-aligned contacts (SAC) on semiconductor integrated circuits)

RN 382-21-8 HCAPLUS

CN 1-Propene, 1,1,3,3,3-pentafluoro-2-(trifluoromethyl)- (9CI) (CA INDEX NAME)



IC ICM H01L021-4763
INCL 438592000
CC 76-3 (Electric Phenomena)
Section cross-reference(s): 75
IT **382-21-8** 593-53-3
RL: PEP (Physical, engineering or chemical process); PROC (Process)
(**plasma etching gas**; double spacer technol. for making self-aligned contacts (SAC) on semiconductor integrated circuits)
REFERENCE COUNT: 19 THERE ARE 19 CITED REFERENCES AVAILABLE FOR THIS RECORD. ALL CITATIONS AVAILABLE IN THE RE FORMAT

L35 ANSWER 22 OF 23 HCAPLUS COPYRIGHT 2006 ACS on STN
ACCESSION NUMBER: 1998:545813 HCAPLUS
DOCUMENT NUMBER: 129:238725
TITLE: Fluorocarbon dry-**etching** and cleaning **gas**
INVENTOR(S): Itano, Atsushi
PATENT ASSIGNEE(S): Daikin Industries, Ltd., Japan
SOURCE: Jpn. Kokai Tokkyo Koho, 4 pp.
CODEN: JKXXAF
DOCUMENT TYPE: Patent
LANGUAGE: Japanese
FAMILY ACC. NUM. COUNT: 1
PATENT INFORMATION:

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
JP 10223614	A2	19980821	JP 1997-27382 <--	19970212
WO 9836449	A1	19980820	WO 1998-JP496 <--	19980205

W: CN, KR, SG, US
RW: AT, BE, CH, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE

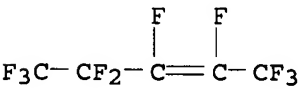
PRIORITY APPLN. INFO.: JP 1997-27382 A 19970212 <--
OTHER SOURCE(S): MARPAT 129:238725
AB The **gas** for **etching** of Si, SiO2, Si3N4, or high-m.p. metal silicide films and for cleaning of etching chambers in manufacture of semiconductor devices contains CnFmHlOCxFyHz (n, x = 1-5, m, y = 0-11, m = y ≠ 0, l, z = 0-11, l = z ≠ 0), CaF2a+1OCF:CF2 (a = 1-3), and/or CaF2a+1CO2CH2CF3 (a = 1-3),

preferably selected from (CF3)2C:CFOCH3, COF2, (CF3)2CMeCOF, (CF3)2CHCF2OMe, CF3CHFCH2F, CF3CHFCF3, CF3CHFCHF2, CHF2CF2CH2F, CF3CH:CF2, CF3CF:CHF, CF3CH2CH2CF3, CF3CH2CF2CF3, HCF2CF2CF2CHF2, CF3CHFCHFCF2CF3, CF3CF:CFCF2CF3, C2F5I, (CF3)2CHCHFCF2CF3, (CF3)2CFCHFCHFCF3, 2,2,3,3-tetrafluorooxetane, 2,2,3,4,4-pentafluorooxetane, and 1,1,1,3,3-pentafluoropropane (245fa). The gas shows much less coefficient of global warming effect.

IT **72804-49-0**
RL: TEM (Technical or engineered material use); USES (Uses)
(fluorocarbon **gas** for dry **etching** and for cleaning of CVD chamber)

RN 72804-49-0 HCAPLUS

CN 2-Pentene, 1,1,1,2,3,4,4,5,5,5-decafluoro- (9CI) (CA INDEX NAME)



IC ICM H01L021-3065
ICS C23F004-00; H01L021-304

CC 76-3 (Electric Phenomena)

ST fluorocarbon dry **etching gas**; cleaning CVD chamber gas fluorocarbon; semiconductor device fabrication **etching** cleaning **gas**

IT Vapor deposition process
(chemical; fluorocarbon **gas** for dry **etching** and for cleaning of CVD chamber)

IT **Etching**
(dry; fluorocarbon **gas** for dry **etching** and for cleaning of CVD chamber)

IT Refractory metal silicides
RL: MSC (Miscellaneous)
(fluorocarbon **gas** for dry **etching** and for cleaning of CVD chamber)

IT Semiconductor device fabrication
(fluorocarbon **gas** for dry **etching** and for cleaning of CVD chamber in manufacture of semiconductor device)

IT 7440-21-3, Silicon, miscellaneous 7631-86-9, Silica, miscellaneous 12033-89-5, Silicon nitride, miscellaneous
RL: MSC (Miscellaneous)
(fluorocarbon **gas** for dry **etching** and for cleaning of CVD chamber)

IT 353-50-4, Carbonic difluoride 354-64-3 360-53-2 377-36-6 382-26-3 407-59-0 431-31-2 431-63-0 431-89-0 460-73-1, 1,1,1,3,3-Pentafluoropropane 679-86-7 690-27-7 765-63-9, 2,2,3,3-Tetrafluorooxetane 1735-87-1 2252-83-7 2924-29-0 **72804-49-0** 85720-78-1 90278-00-5 138495-42-8 144109-03-5, 2,2,3,4,4-Pentafluorooxetane
RL: TEM (Technical or engineered material use); USES (Uses)
(fluorocarbon **gas** for dry **etching** and for cleaning of CVD chamber)

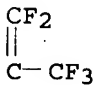
L35 ANSWER 23 OF 23 HCAPLUS COPYRIGHT 2006 ACS on STN
ACCESSION NUMBER: 1982:537927 HCAPLUS
DOCUMENT NUMBER: 97:137927
TITLE: In situ analysis of fluorinated **gases** in **plasma etching** by infrared spectroscopy

AUTHOR(S): Poll, H. U.; Hinze, D.; Schlemm, H.
CORPORATE SOURCE: Tech. Hochsch. Karl-Marx-Stadt, Karl-Marx-Stadt, DDR-9010, Ger. Dem. Rep.
SOURCE: Applied Spectroscopy (**1982**), 36(4), 445-51
CODEN: APSPA4; ISSN: 0003-7028
DOCUMENT TYPE: Journal
LANGUAGE: English

AB IR absorption spectroscopy proves to be a useful tool in the evaluation of plasma chemical conversions of **etch gas** mixts. during **plasma etching** for microelectronics. The partial pressures of the various perfluorinated gas components are obtained from IR spectra with sufficient accuracy and may yield information about the actual state of the system. Methods of spectra recording and partial pressure computation are discussed. To demonstrate the applicability of the method, the conversions of CF4 + O2, and C2F4 in a glow discharge are investigated.

IT **382-21-8**
RL: ANT (Analyte); ANST (Analytical study)
(determination of, in **plasma etch gases** by IR spectroscopy)

RN 382-21-8 HCAPLUS
CN 1-Propene, 1,1,3,3,3-pentafluoro-2-(trifluoromethyl)- (9CI) (CA INDEX NAME)



CC 80-6 (Organic Analytical Chemistry)
Section cross-reference(s): 73, 76

ST fluorinated **gas plasma etching** analysis; IR fluorinated gas analysis; microelectronics **plasma etching gas** analysis

IT Perfluorocarbons
RL: ANT (Analyte); ANST (Analytical study)
(determination of, in **plasma etch gases** by IR spectroscopy)

IT Electronics
(micro-, plasma etching of, IR spectroscopy anal. of fluorinated **etch gases** during)

IT 75-73-0 76-16-4 76-19-7 116-14-3, analysis 116-15-4 353-50-4 355-25-9 **382-21-8** 7783-61-1
RL: ANT (Analyte); ANST (Analytical study)
(determination of, in **plasma etch gases** by IR spectroscopy)

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